



PowerBook G4 (12-inch)

February 28, 2003



Take Apart
PowerBook G4 (12-inch)



General Information



Overview

Some of the key features that distinguish this computer from earlier notebook models include:

- 12-inch active-matrix display in aluminum alloy enclosure
- built-in Bluetooth
- slot load optical drive
- optional AirPort Extreme Card and Base Station

New Procedures

If you are familiar with taking apart notebook computers, you will notice some differences with this model:

- Memory card is easily accessible from the bottom of the computer.
- Optional AirPort Extreme Card is accessed from the battery bay.
- The number and types of screws differ from earlier models.
- Additional parts that are offered for replacement include Bluetooth and the subwoofer.

Tools

Most of the tools required for taking apart this computer are the same as for earlier notebook models; however, there are two new tools:

- 1.5 mm hex driver (small hex head screwdriver) used for the top case and the display housing
- 4 mm socket wrench or needlenose pliers used for the DC-to-DC board

The following tools are recommended for this computer:

- Coin
- ESD wriststrap and mat
- Small soft cloth
- Black stick (or other nonconductive nylon or plastic flat-blade tool)
- #0 Phillips screwdriver (magnetized)
- #1 Phillips screwdriver (magnetized)
- Jeweler's flat-blade screwdriver
- 1.5 mm hex driver
- 4 mm socket wrench or needlenose pliers

Important: To organize the screws you remove from the computer, use a tray with divided compartments (such as a plastic ice cube tray). If doing a complete disassembly, note the screws removed from each location in the computer.

Serial Number Location

The serial number is located in the battery bay.





Battery

Tools

This procedure requires the following tools:

- Soft cloth
- Coin

Part Location



Preliminary Steps

Warning: Always shut down the computer before opening it to avoid damaging its internal components or causing injury. After you shut down the computer, the internal components can be very hot. Let the computer cool down before continuing.

Procedure

Warning: If the computer has been recently operating, allow it to cool down before performing this procedure.

1. Shut down the computer.
2. Unplug the power adapter and phone cord.
3. Turn over the computer and place it on a soft cloth.
4. Use a coin to release the battery lock.
5. Lift the battery out of the battery bay.



6. Install the replacement battery, and reassemble and test the computer.



Memory Door and Memory Card

Tools

This procedure requires the following tools:

- Soft cloth
- #0 Phillips screwdriver
- Black stick (or other nonconductive nylon or plastic flat-blade tool)

Part Location



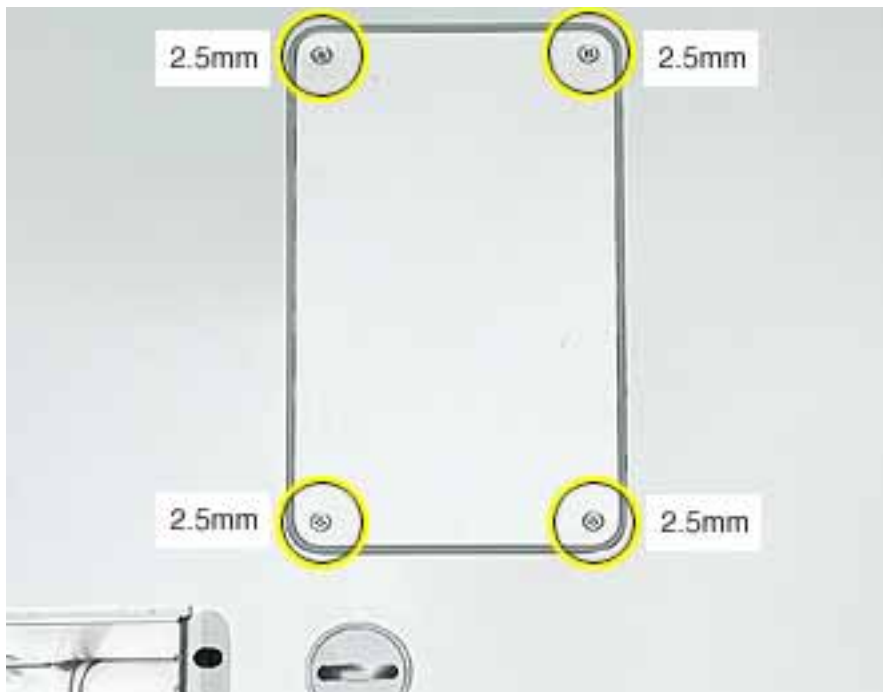
Preliminary Steps

Before you begin, remove the battery.

Procedure

Warning: If the computer has been recently operating, allow it to cool down before performing this procedure.

1. Place the computer upside down on a soft cloth.
2. Remove the four identical screws from the memory door.
3. Use a black stick to lift off the memory door.



4. If a memory card is already installed, release it by spreading apart the tabs in the expansion slot from the notches in the card. Allow the card to pop up slightly, and pull it out of the memory slot.



5. Insert the replacement memory card into the expansion slot at a 30-degree angle.



6. Make sure the memory card is fully inserted. Check that the notches in the card clear the tabs as you press down on the sides of the card to lock it into place.



7. Install the memory door back onto the bottom case, and reassemble and test the computer.



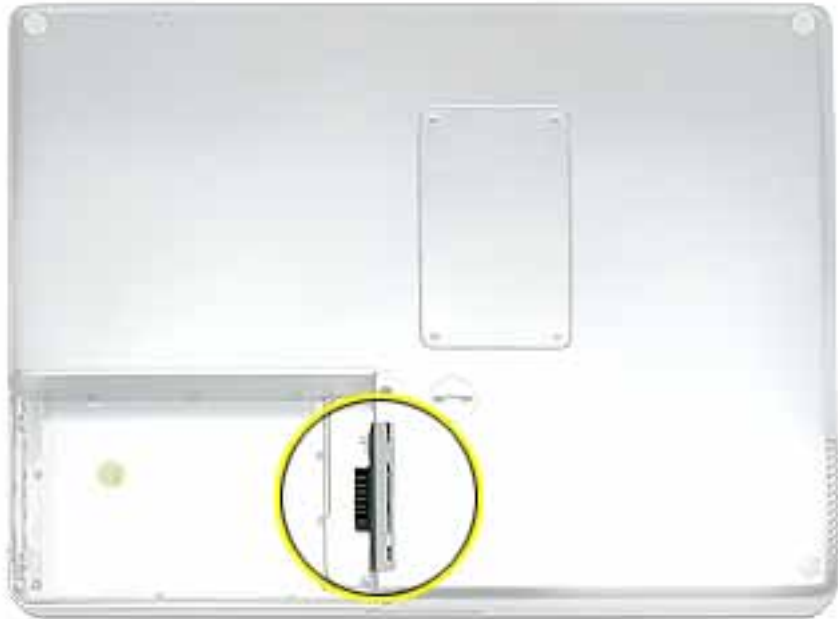
AirPort Extreme Card

Tools

This procedure requires the following tools:

- Black stick (or other nonconductive nylon or plastic flat-blade tool)

Part Location



Preliminary Steps

Before you begin, remove the battery.

Procedure

Warning: If the computer has been recently operating, allow it to cool down before performing this procedure.

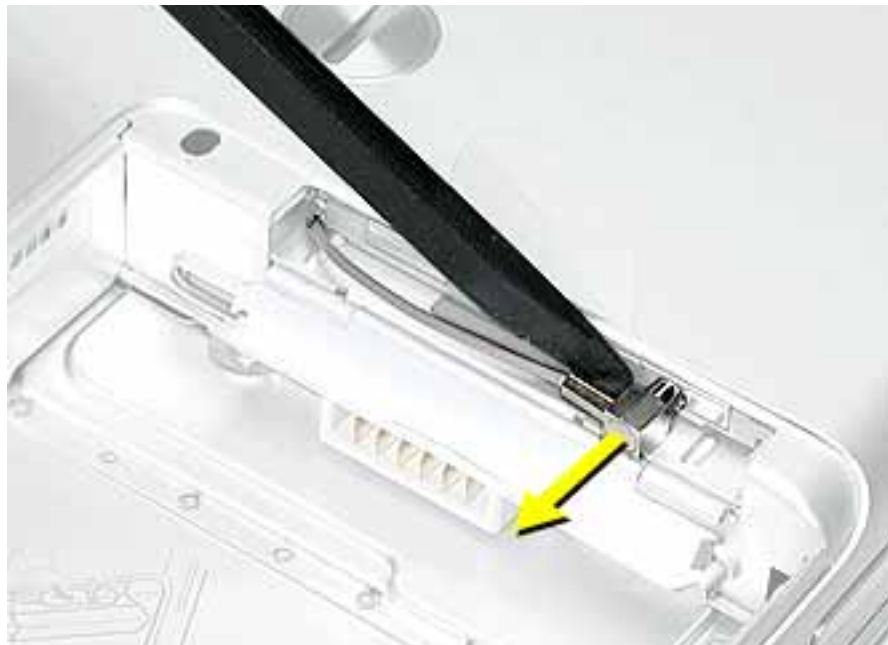
1. Touch a metal surface inside the battery bay to discharge static electricity built up on your body.



2. Open the door to the AirPort slot.
3. If an optional AirPort Extreme Card is already installed, use a black stick to un-loop the pull tab.



4. Gently disconnect the AirPort antenna cable.



5. Use the pull tab to pull out the card.



- Slide the replacement AirPort Extreme Card into the slot, as shown.



7. Connect the end of the antenna cable to the card.
8. Loop the clear plastic tab over and under the card so that the tab secures the antenna cable and tucks into the slot.



Note: The AirPort slot on the bottom case has a recessed inner slot designed for the clear plastic tab to tuck into.



9. Close the AirPort door, and reassemble and test the computer.



Keyboard

Tools

This procedure requires the following tools:

- #0 Phillips screwdriver
- Black stick (or other nonconductive nylon or plastic flat-blade tool)

Note: To organize the screws you remove from the computer, use a tray with divided compartments (such as a plastic ice cube tray).

Part Location



Preliminary Steps

Before you begin, remove the following:

- Battery
- Memory door and memory card

Procedure

1. With the computer upside down on a soft cloth, remove the single screw and small EMI shield from the memory card bay.

Replacement Note: Make sure you replace the screw and EMI shield so that the EMI shield is positioned with the finger-like projection pointing up.

2. Open the computer, and locate the following keys:

- F1
- F2
- F11
- F12



3. **Important:** Using a black stick, carefully pry up each of the four keys from the left side of each key. The keys are easily removed from the left side without damaging the keyboard.



4. Use a black stick or flat-blade screwdriver to lift off the two round stickers that are located between the two key mechanisms. Reserve the stickers for replacement.



5. Remove the screw under each of the stickers.



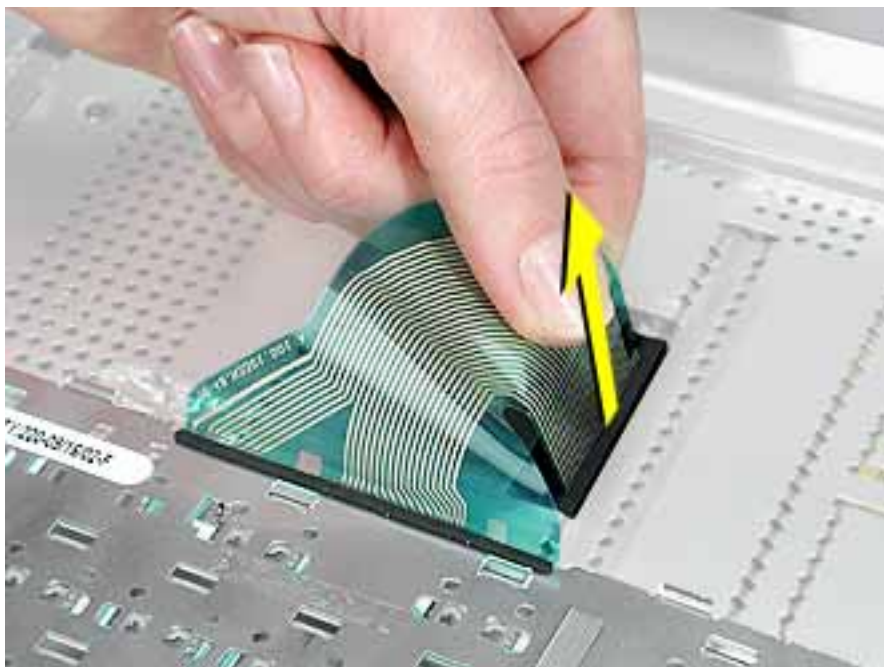
-
- Lift up the top two corners of the keyboard, and move the keyboard toward the display to clear the tabs at the bottom of the keyboard.



7. Flip the keyboard over and lay the keyboard flat on the trackpad.
8. Use a black stick to carefully remove the aluminum tape that covers the keyboard connector. You will need to reuse the tape when reassembling the computer.



9. Peel up the keyboard cable from its adhesive. Using a black stick, pry up the tabs at the ends of the connector, and then pull the cable straight up to disconnect it.



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10. Install the replacement keyboard. Make sure you
 - Install the foil tape in the recessed area over the keyboard connector.
 - Set the tabs at the bottom of the keyboard into the slots in the top case.
 - Press the keyboard into place, and install the screws and round stickers.
 - Install the function keys:
 - Position the key directly over the scissor mechanism.
 - Press the key onto the scissor.
 - Check the operation of the key.
 - Close the display and install the final screw in the memory bay.



11. Reassemble and test the computer.



Top Case

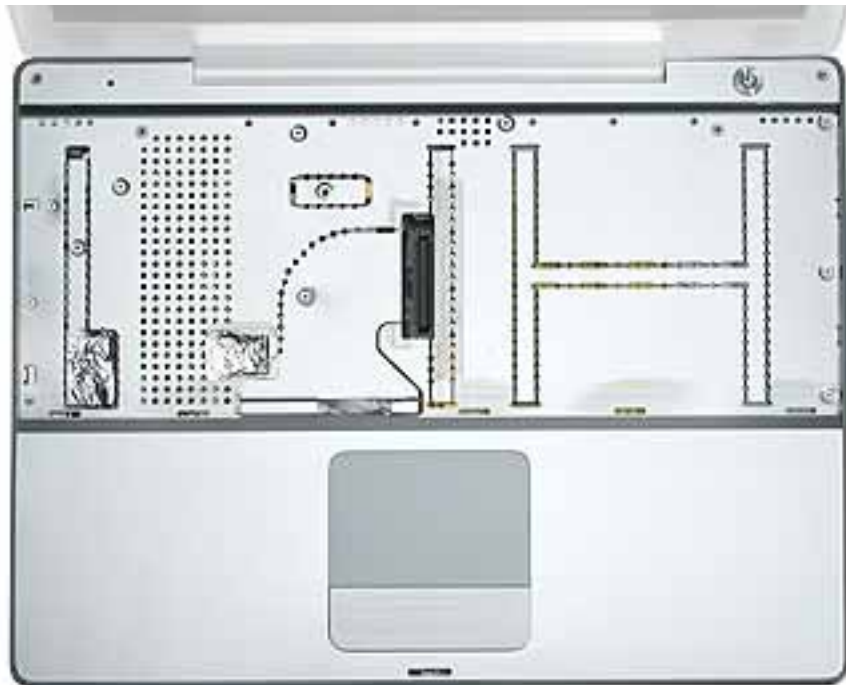
Tools

This procedure requires the following tools:

- #0 Phillips screwdriver
- Black stick (or other nonconductive nylon or plastic flat-blade tool)
- Hex 1.5 mm screwdriver

Note: To organize the screws you remove from the computer, use a tray with divided compartments (such as a plastic ice cube tray).

Part Location



Preliminary Steps

Before you begin, remove the following:

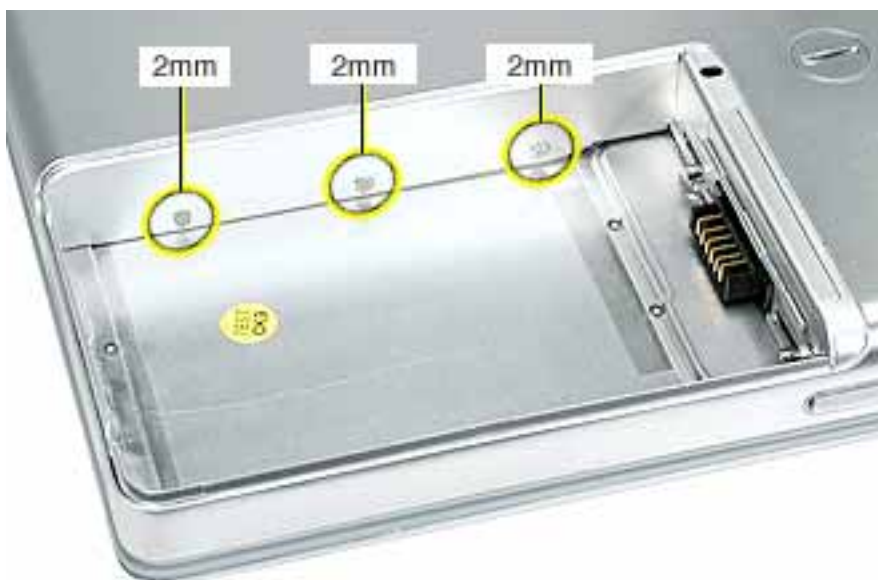
- Battery
- Memory door and memory card
- Keyboard

Procedure

1. **Warning:** The screws in the battery bay require holding the screwdriver at an angle. Be careful not to strip the screws.

Note: Avoid scratching the external housing by using care when removing the screws. You might want to cover part of the housing with a soft cloth as you remove screws.

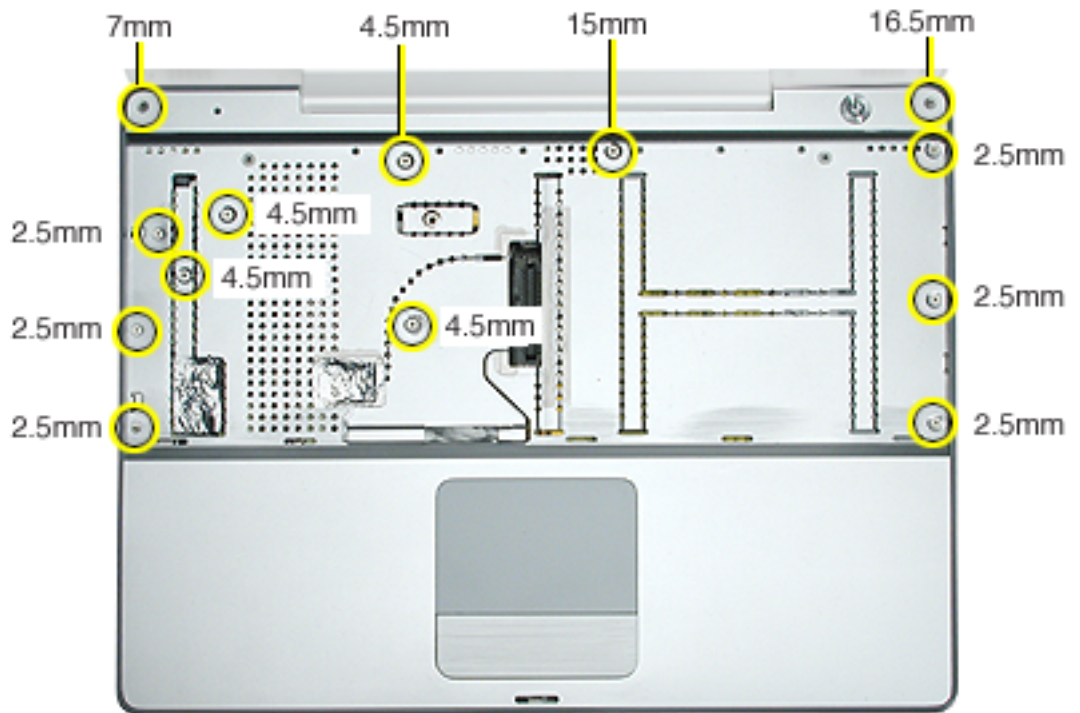
With the computer upside down on a soft cloth, remove the three screws from the bottom case at the battery bay.



2. Remove the screws near the display hinge.



3. Open the display, and with the computer upright, remove the following 13 screws from the top case:
 - one Hex, 16.5 mm long screw at upper right corner near power button
 - one Hex, 7 mm long screw at upper left corner near microphone
 - one #0 Phillips, 15 mm long screw in keyboard well
 - four #0 Phillips, 4.5 mm long screws in keyboard well
 - six #0 Phillips, 2.5 mm long screws in keyboard well



4. Remove two screws from the front right side of the top case.



5. Remove two screws from the front left side of the top case.



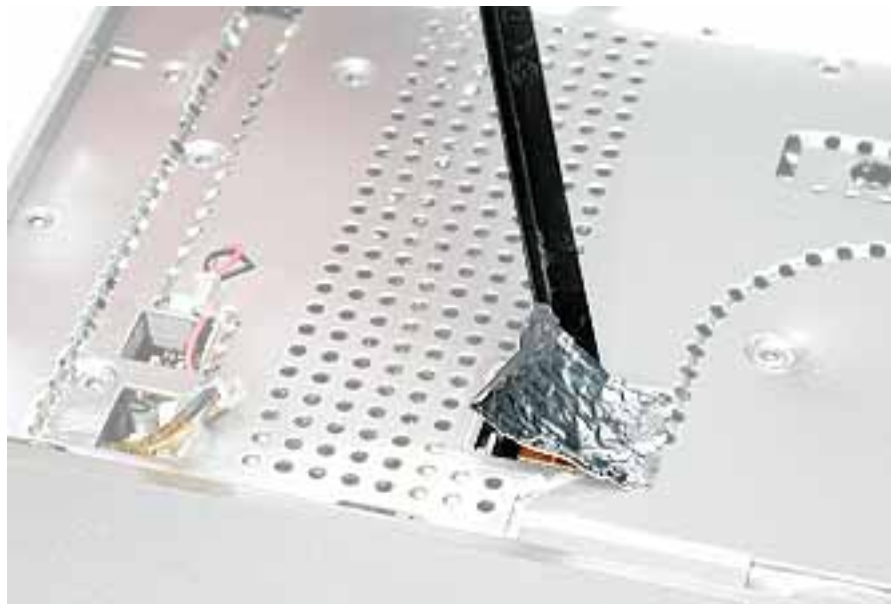
6. Carefully remove the foil tape from the keyboard well that covers the microphone cable and power cable. You will need to reuse the tape when reassembling the computer.
7. Use a black stick in the small openings to disconnect the two cables.



8. Remove the screw near the cables.



9. Carefully remove the foil tape over the trackpad cable. You will need to reuse the tape when reassembling the computer.



10. Use the pull tab to release the trackpad cable.

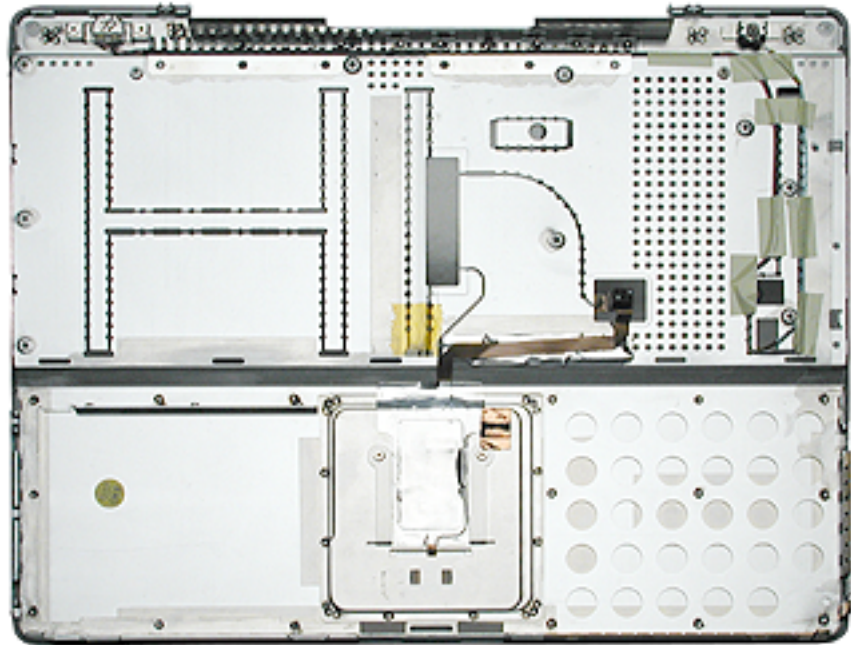


11. Use a black stick running along the edge of the top case to lift up the top case from the bottom case. Use equal pressure at the front, left, and right corners.



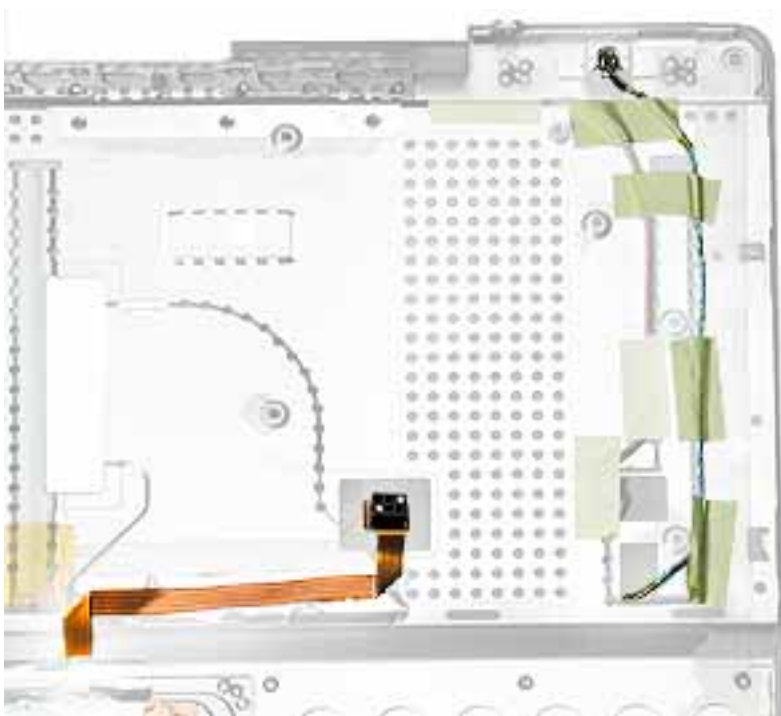
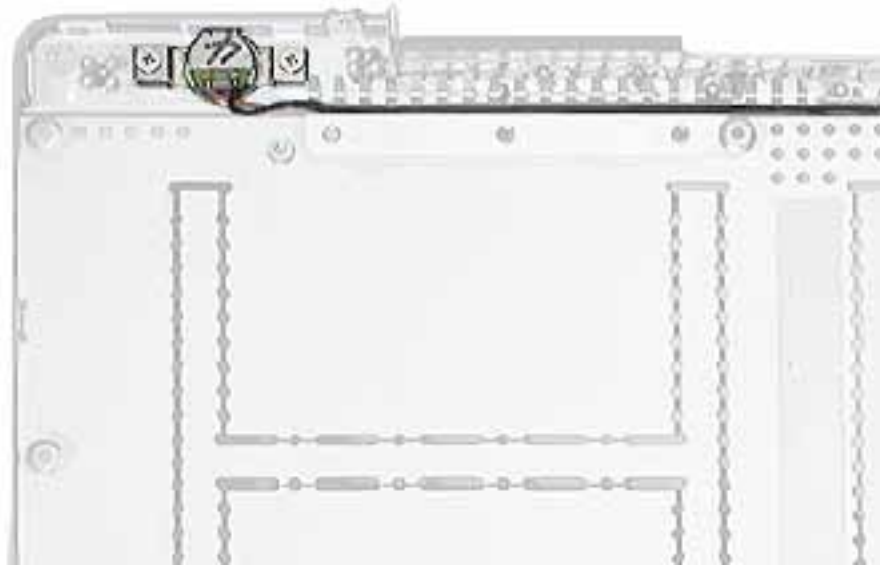
12. The top case includes the following:

- Microphone cable
- Trackpad and trackpad cable
- Power button and cable
- Tape
- Welded EMI strips



13. Before installing a replacement top case, check the cable routing of the
 - Microphone cable
 - Trackpad cable
 - Power button cable

Make sure the cables are routed correctly and cannot be pinched when installing the top case.



14. Install the replacement top case, and reassemble and test the computer.



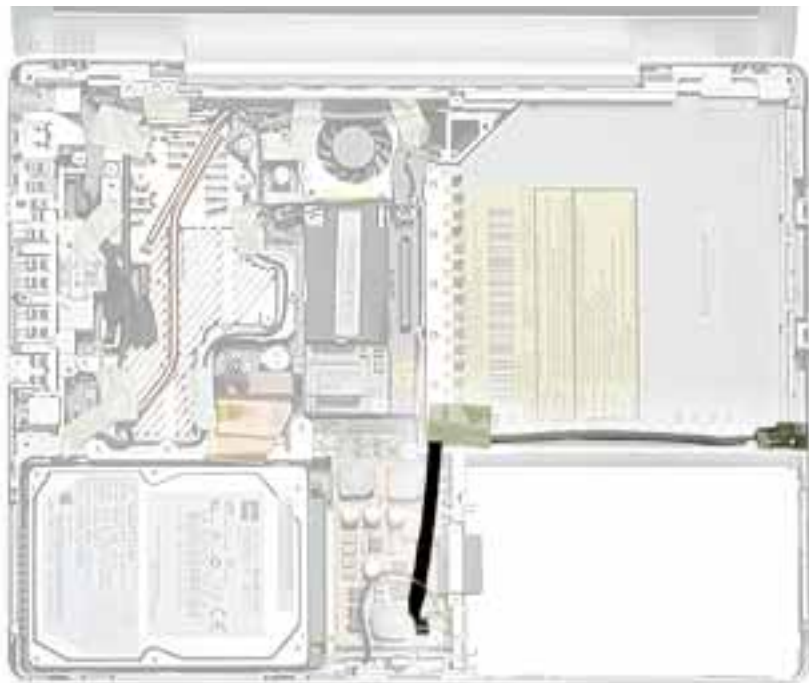
Reed Switch Board and Cable

Tools

This procedure requires the following tools:

- Phillips #0 screwdriver
- Black stick (or other nonconductive nylon or plastic flat-blade tool)

Part Location



Preliminary Steps

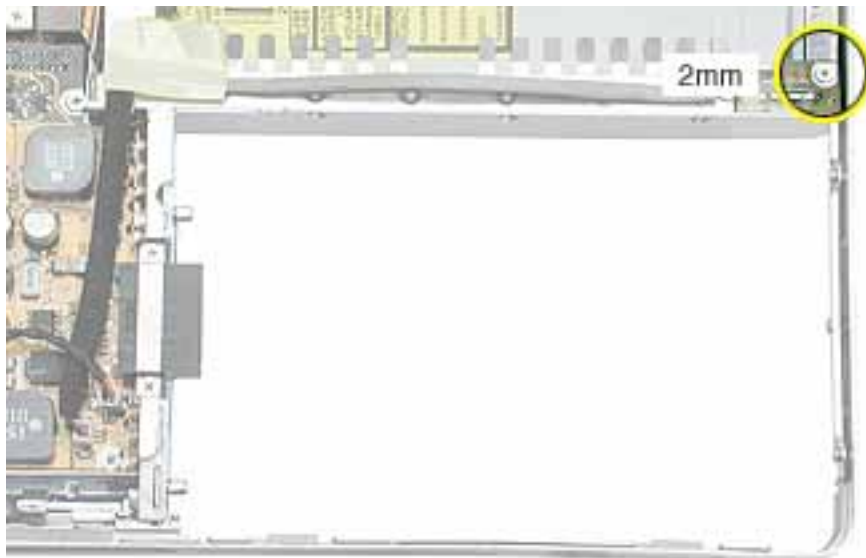
Before you begin, remove the following:

- Battery
- Memory door and memory card
- Keyboard
- Top case

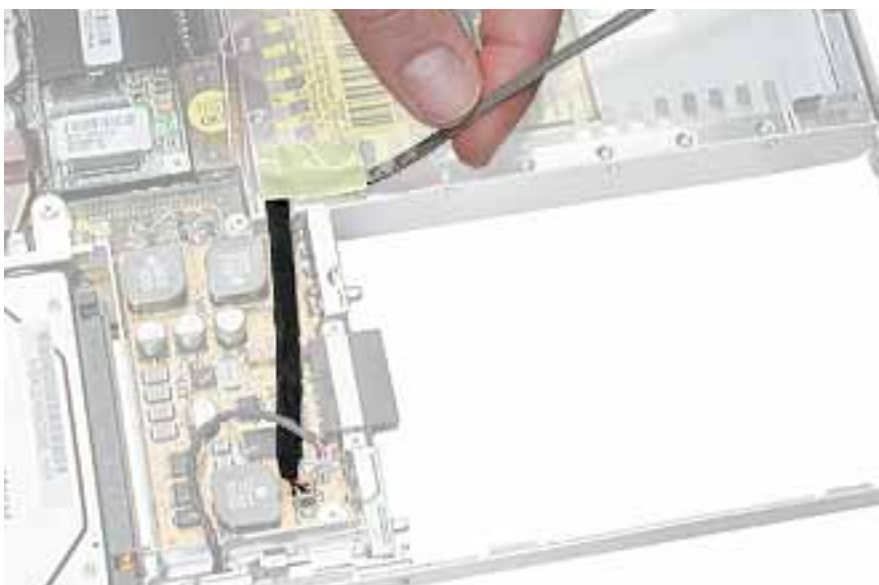
Procedure

1. Remove the screw from the reed switch board.

Warning: When replacing the board, make sure you use the same screw. A longer screw could scratch the optical media.



2. Tilt the board up and away from the tab at the battery area.
3. Lift up the tape from the corner of the optical drive, and disconnect the 3-pin connector from CN4 at the DC-to-DC board.



4. Install the replacement reed switch board and cable, and reassemble and test the computer.



Hard Drive

Tools

This procedure requires the following tools:

- #0 Phillips screwdriver
- Black stick (or other nonconductive nylon or plastic flat-blade tool)

Note: To organize the screws you remove from the computer, use a tray with divided compartments (such as a plastic ice cube tray).

Part Location



Preliminary Steps

Before you begin, remove the following:

- Battery
- Memory door and memory card

- Keyboard
- Top case

Procedure

1. Disconnect the hard drive flex cable.



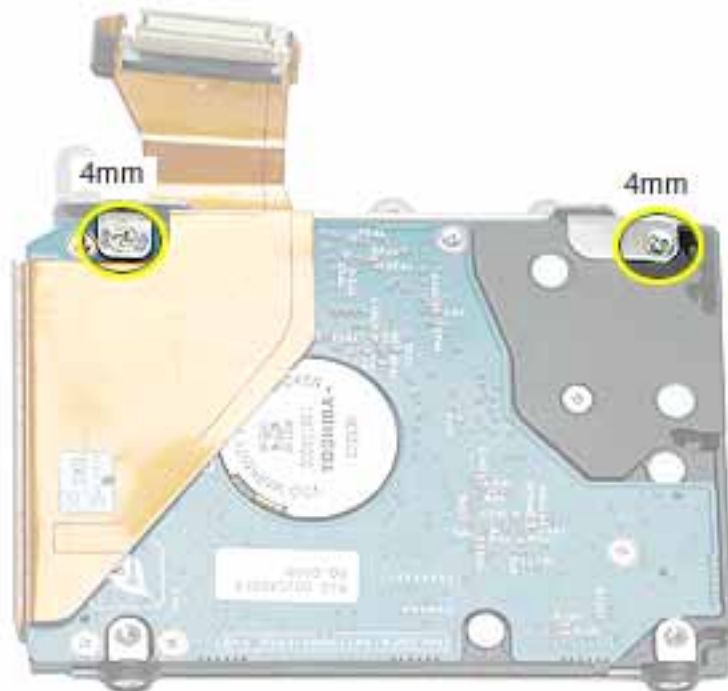
2. Remove two screws from the hard drive bracket.



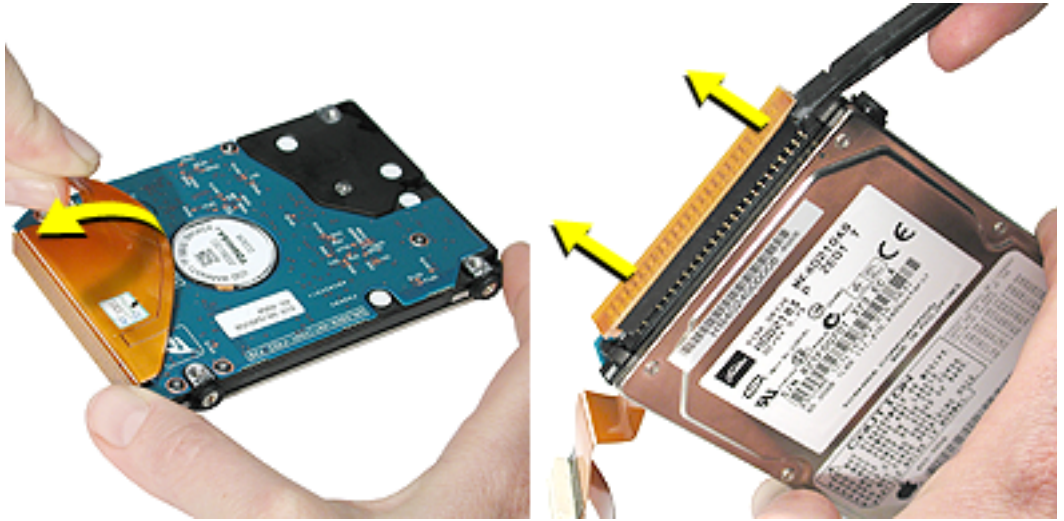
3. Use the flex cable to lift up the hard drive, bracket, and cable from the computer housing.



4. Turn over the hard drive and remove the two screws from the underside of the bracket.



5. Peel up the flex cable from its double-sided tape.
6. Use a black stick to pry the flex cable connector up slightly on each side, and then pull it straight off the drive. Be careful not to bend any pins.



7. Remove the two screws and grommets from the opposite side of the drive.



8. **Replacement Note:** When installing the replacement drive, make sure the center flange of the hard drive bracket fits over the small post on the computer frame.



9. Install the replacement hard drive, and reassemble and test the computer.



DC-to-DC Board

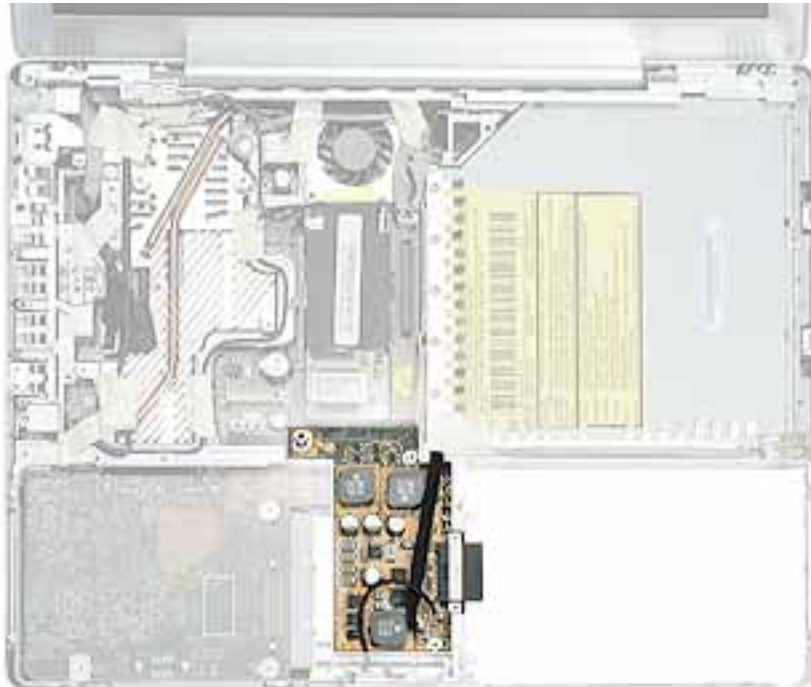
Tools

This procedure requires the following tools:

- #0 Phillips screwdriver (magnetized preferred)
- Black stick (or other nonconductive nylon or plastic flat-blade tool)
- 4 mm socket wrench or needlenose pliers

Note: To organize the screws you remove from the computer, use a tray with divided compartments (such as a plastic ice cube tray).

Part Location



Preliminary Steps

Before you begin, remove the following:

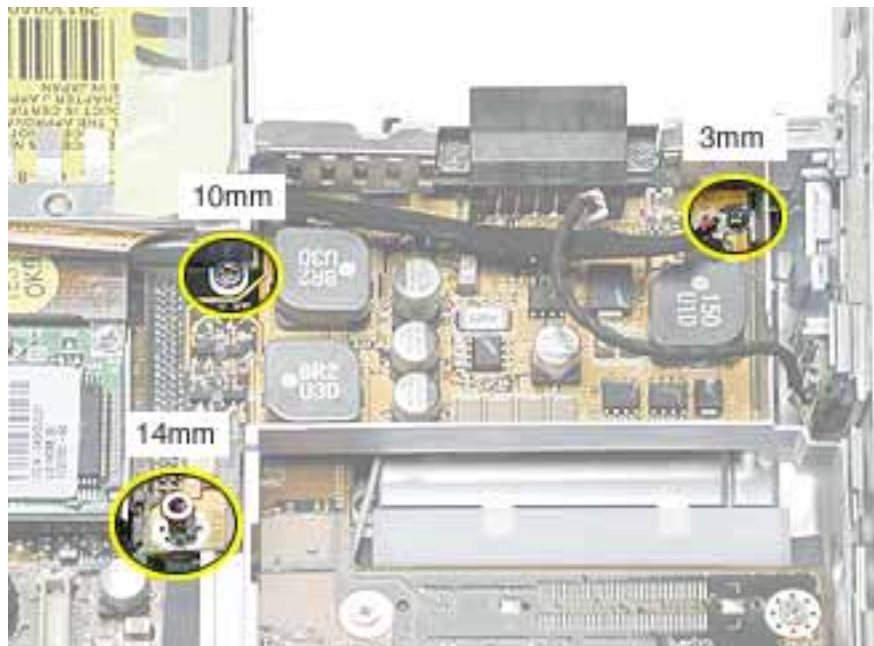
- Battery

- Memory door and memory card
- Keyboard
- Top case
- Hard drive

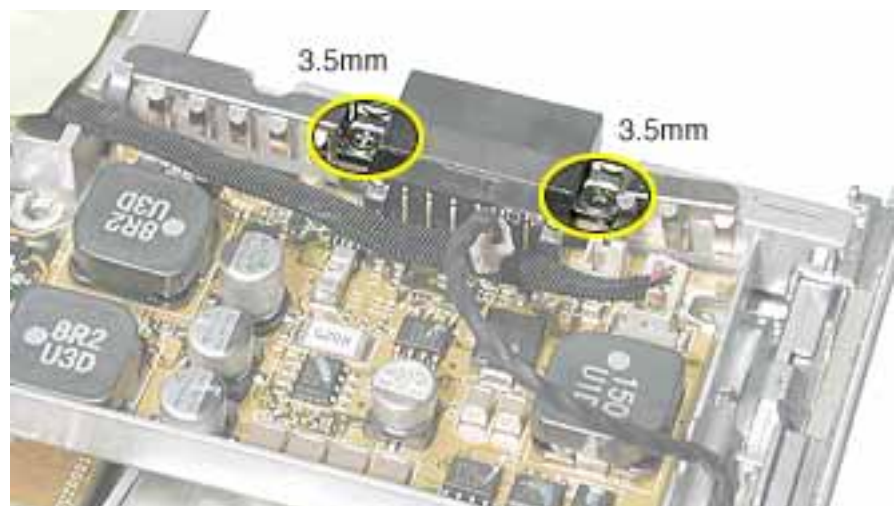
Procedure

1. Remove the three screws from the DC-to-DC board.

Note: When removing the 3 mm-long screw, the magnetic latch might draw the screw toward it.



2. Remove the two screws at the battery connector.

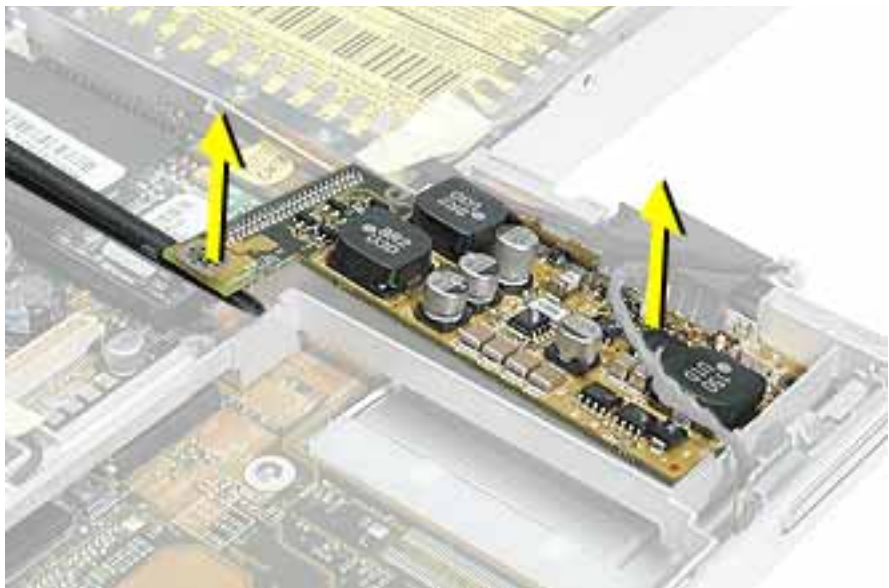


3. Lift off the EMI strip from the battery connector. Be sure to replace it when installing the replacement DC-to-DC board.



4. Use a black stick to tilt up the board from the logic board, and lift the opposite end of the board to remove it from the computer housing.

Warning: To avoid bending pins, lift the board evenly at both ends.



5. Install the replacement DC-to-DC board, and reassemble and test the computer.



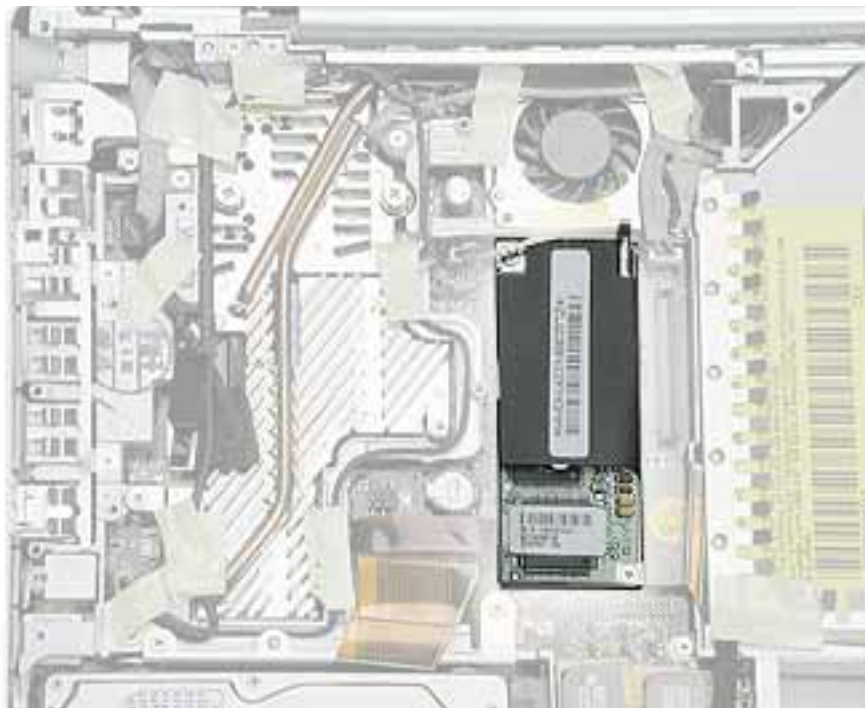
Modem

Tools

This procedure requires the following tools:

- #0 Phillips screwdriver
- Black stick (or other nonconductive nylon or plastic flat-blade tool)

Part Location



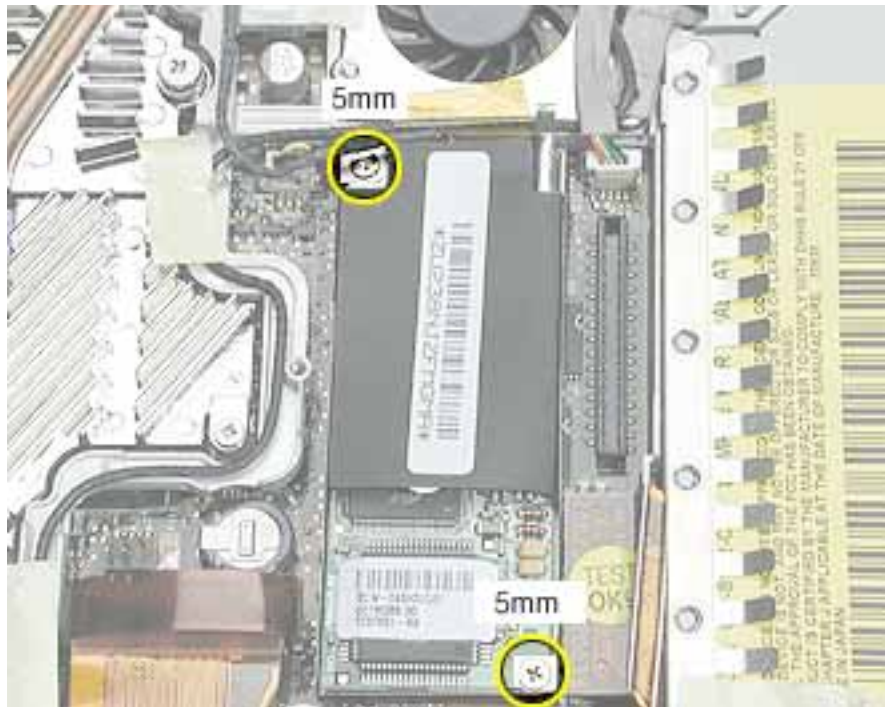
Preliminary Steps

Before you begin, remove the following:

- Battery
- Memory door and memory card
- Keyboard
- Top case

Procedure

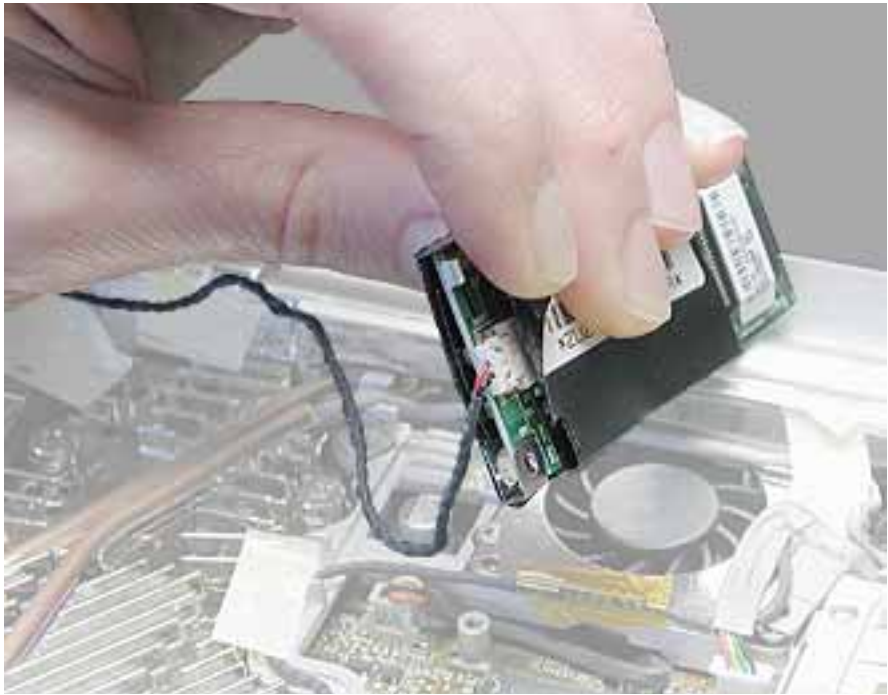
1. Remove the two screws from the modem board.



2. Use a black stick to tilt up the modem and disconnect it from the logic board.



3. At the other end of the modem, disconnect the modem cable from the connector.



Replacement Note: When placing the replacement modem on the logic board, be sure to align the board over the standoffs and connector on the logic board.



4. Install the replacement modem, and reassemble and test the computer.



Heatsink and Fan Assembly

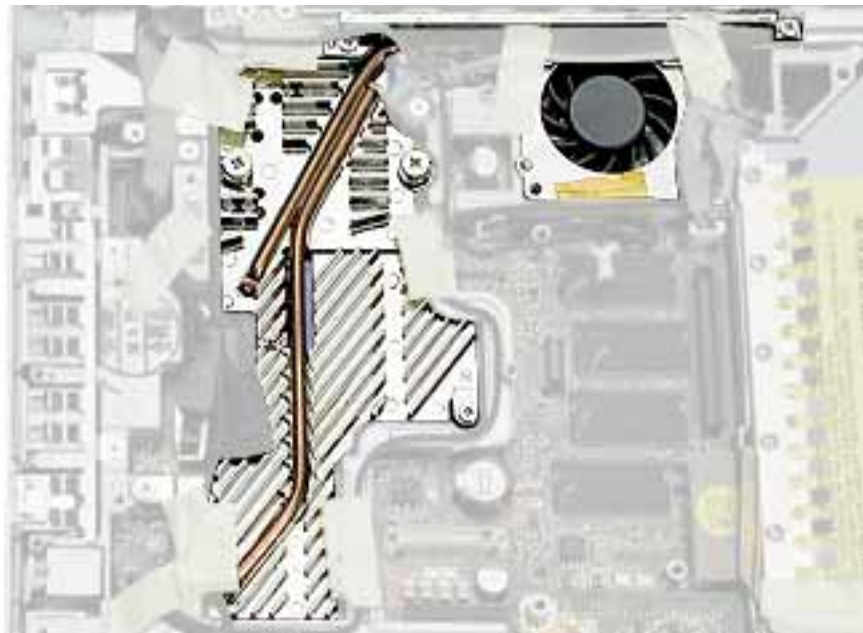
Tools

This procedure requires the following tools:

- #0 Phillips screwdriver
- #1 Phillips screwdriver
- Black stick (or other nonconductive nylon or plastic flat-blade tool)

Note: To organize the screws you remove from the computer, use a tray with divided compartments (such as a plastic ice cube tray).

Part Location



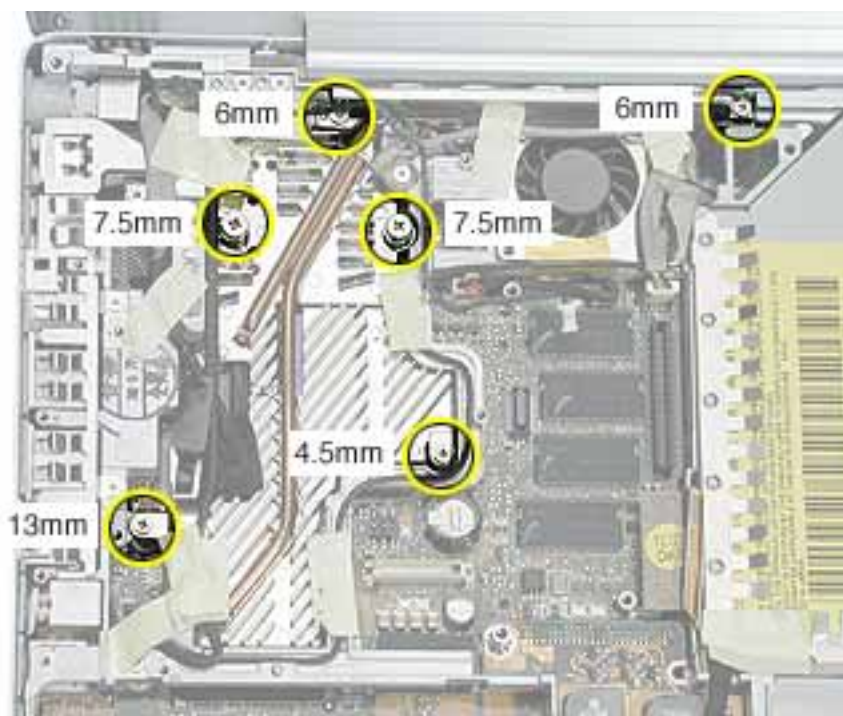
Preliminary Steps

Before you begin, remove the following:

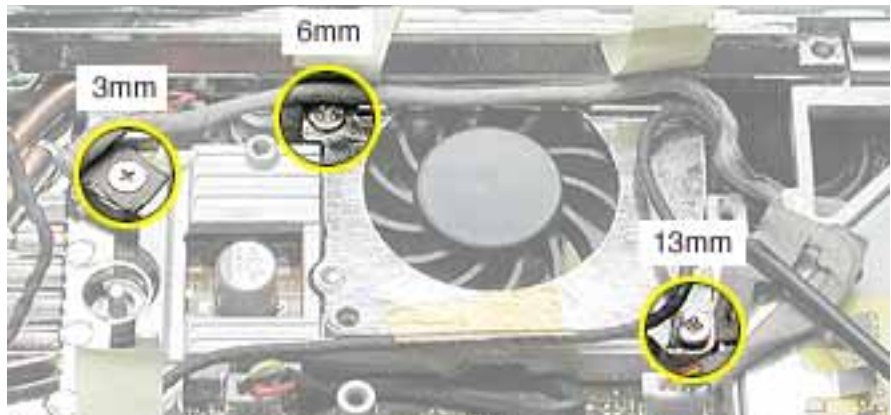
- Battery
- Memory door and memory card
- Keyboard
- Top case
- Modem

Procedure

1. **Warning:** The cone of the subwoofer, located below the heatsink and to the right of the fan, is a sensitive device. Avoid touching the subwoofer cone as you perform this procedure.
2. Peel up the tape if any of the following screws are covered. Remove the following screws from the heatsink:
 - Two 6 mm long #0 Phillips screws
 - Two 7.5 mm long #1 Phillips screws with springs
 - One 13 mm long #0 Phillips screw
 - One 4.5 mm long #0 Phillips screw



3. Remove the tape that covers the heatsink and secures the cables in place.
4. Near the fan, peel up the tape and remove the following screws:
 - One 3 mm long screw
 - One 6 mm long screw
 - One 13 mm long screw



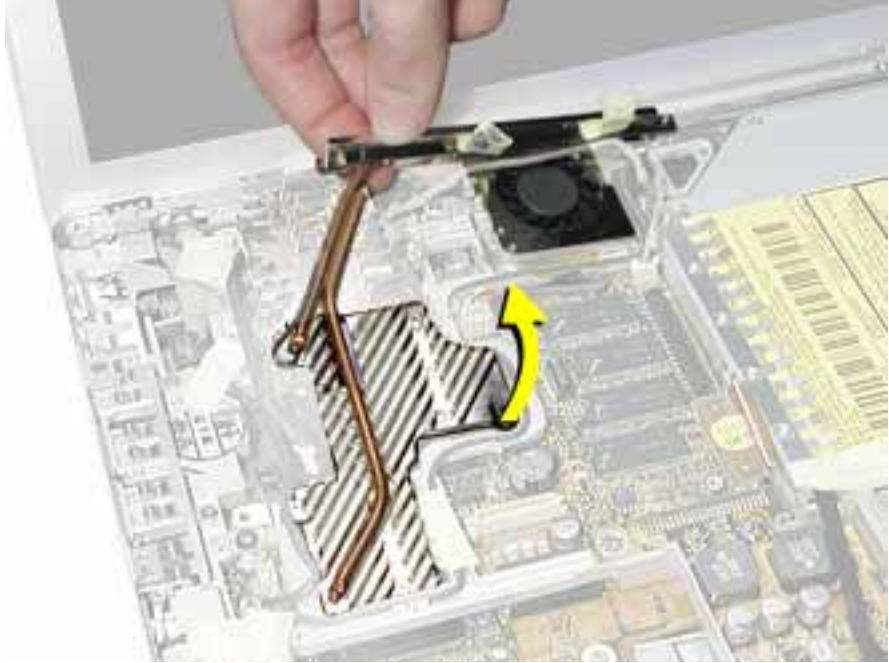
5. Peel up the yellow tape, and disconnect the inverter cable that runs along the top of the fan from the logic board.
6. Remove the transparent tape at the bottom of the fan, and disconnect the fan cable.

Replacement Note: When installing the replacement heatsink assembly, note that the fan cable is routed beneath the computer frame.



7. Holding the heatsink at the crossbar, begin to lift up the heatsink assembly, being careful where it catches on remaining tape and the chassis. Use a black stick to pry up the middle right corner of the heatsink plate.

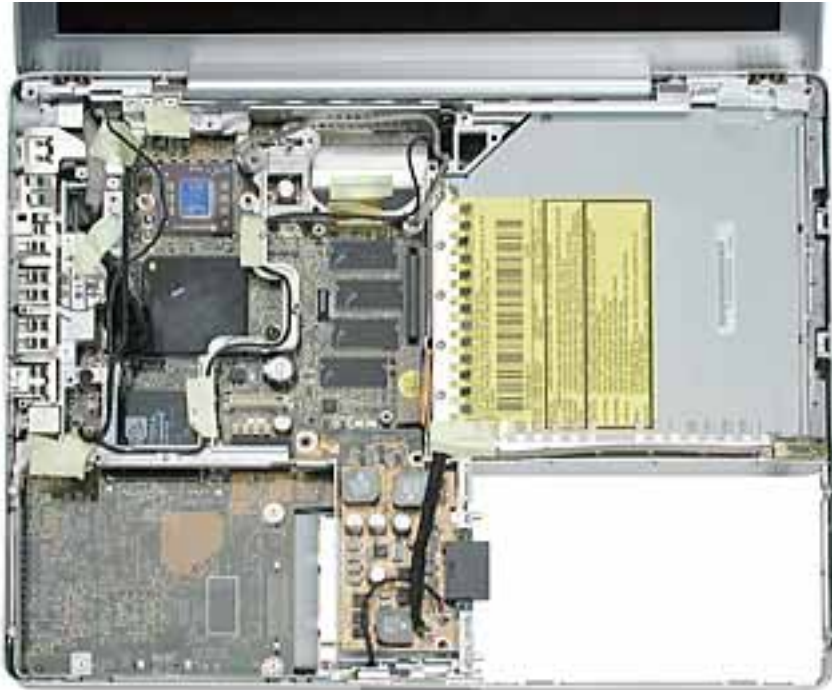
Warning: To avoid bending the heatsink, support the heatsink as it is removed.



8. Route the fan cable through the slot in the computer frame.



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- Note the routing of the remaining cables and the placement of tape once the heatsink is removed.



- Install the replacement heatsink and fan assembly, and reassemble and test the computer.



Inner Frame

Tools

This procedure requires the following tools:

- #0 Phillips screwdriver
- Black stick (or other nonconductive nylon or plastic flat-blade tool)

Note: To organize the screws you remove from the computer, use a tray with divided compartments (such as a plastic ice cube tray).

Part Location



Preliminary Steps

Before you begin, remove the following:

- Battery
- Memory door and memory card
- Keyboard
- Top case

- Reed switch
- Hard drive
- DC-to-DC board
- Modem
- Heatsink with fan

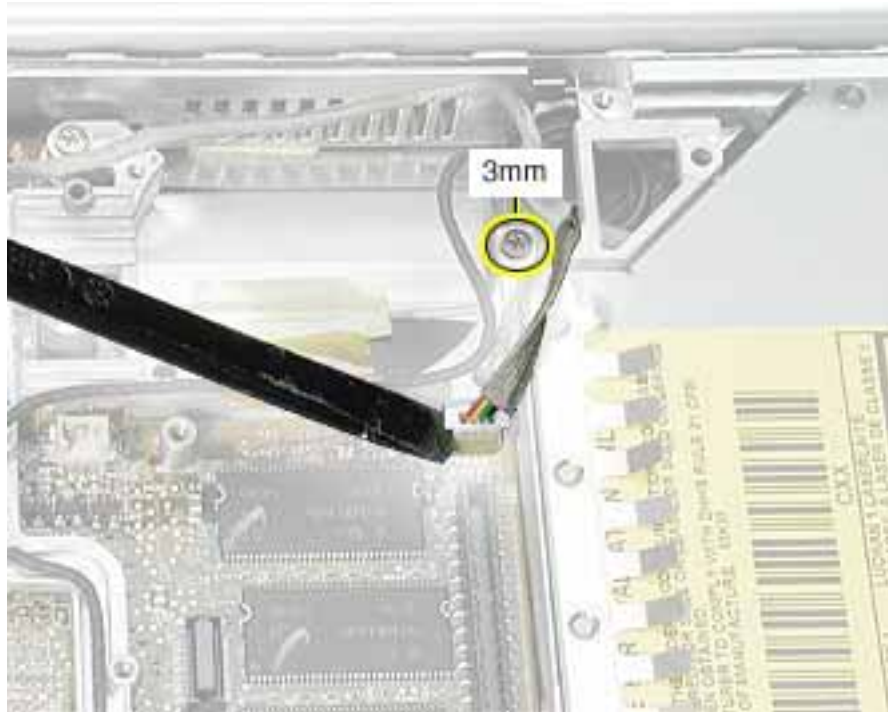
Procedure

1. Note the cable routing and placement of tape before disconnecting cables.

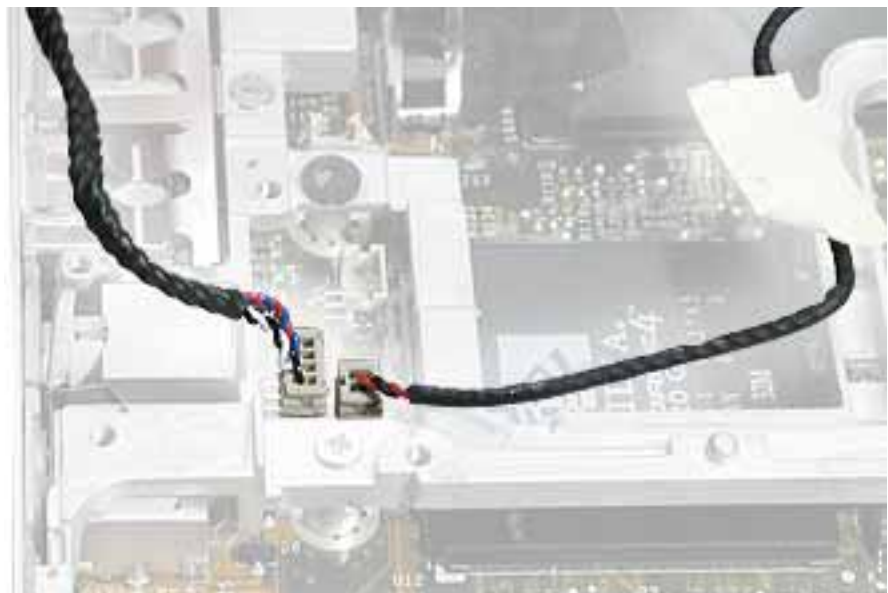
Replacement Note: Reserve the tape for securing cables after the frame replacement.



2. **Warning:** The subwoofer cone, located below the right corner of the frame, is a sensitive device. Avoid touching the cone as you perform this procedure.
3. Disconnect the connector from the upper right corner of the logic board.
4. Remove the screw near the right corner of the frame.



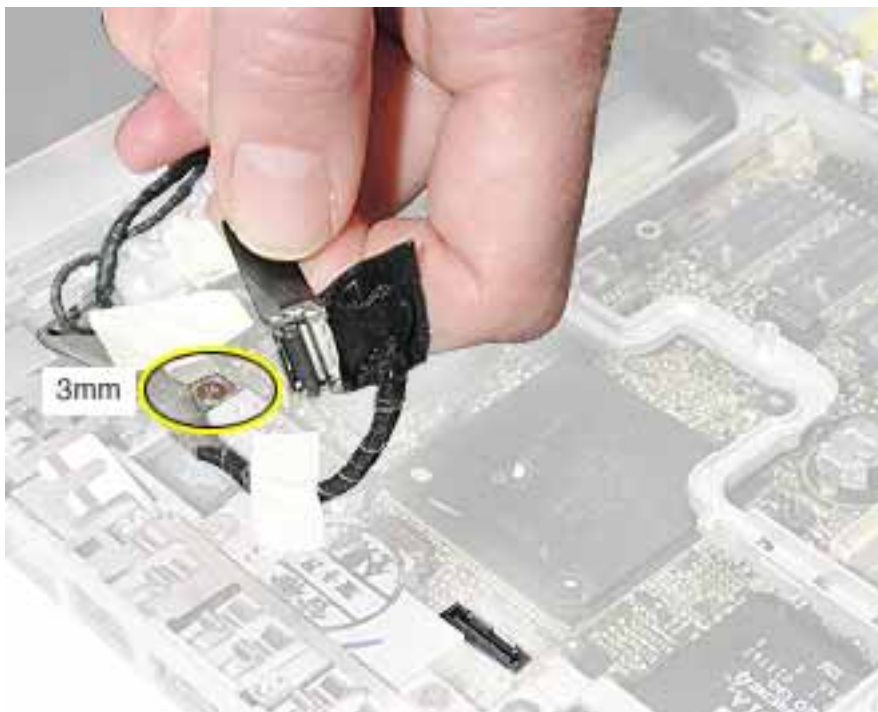
5. Near the I/O ports, disconnect the
 - long black cable from the 2-pin connector
 - shorter black cable from the 4-pin connector



6. Pull up the LVDS cable with the pull tab

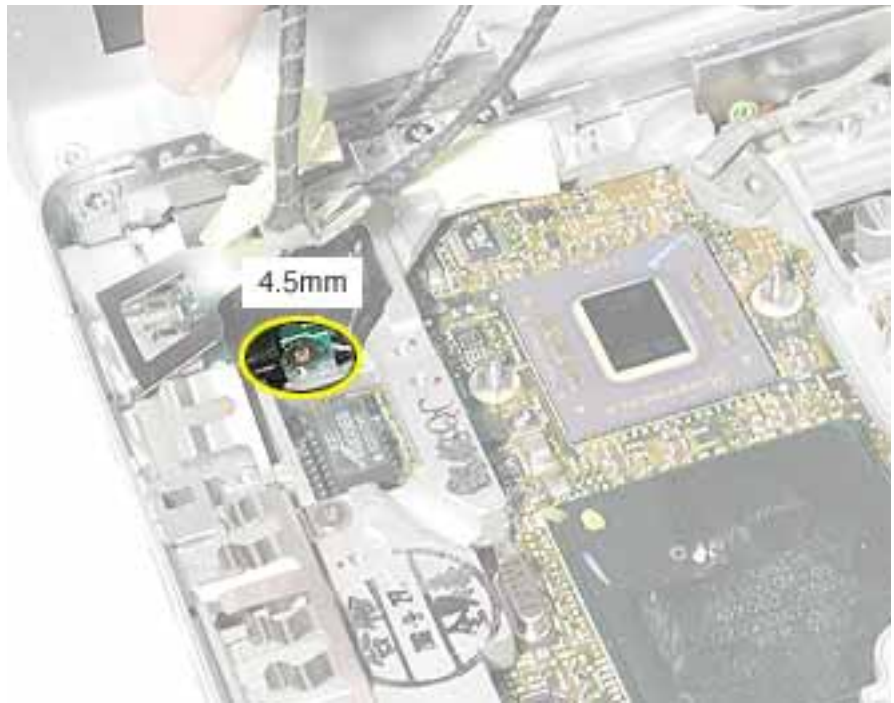
Warning: Be careful not to strain the LVDS cable.

7. Remove the screw at the LVDS cable.



Replacement Note: When reinstalling the LVDS cable, tuck the pull tab under the frame.

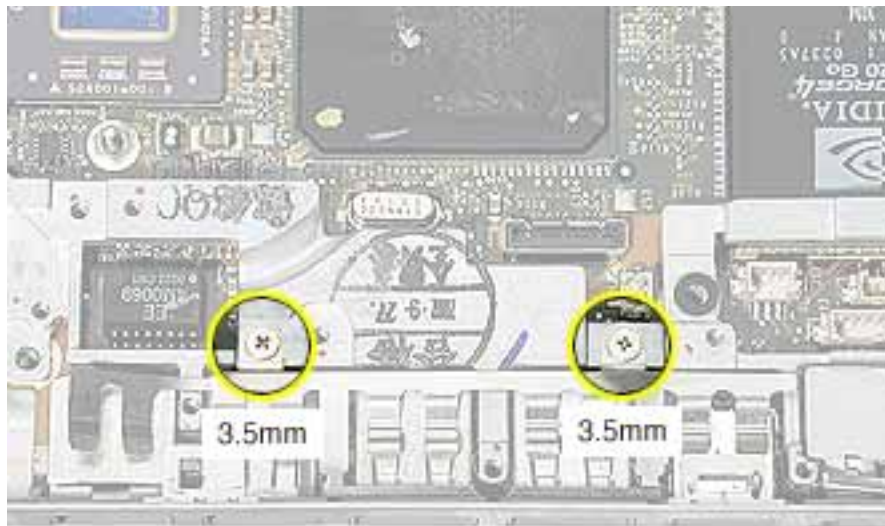
8. Peel up the tape, and remove the screw at the RJ11 modem cable board.



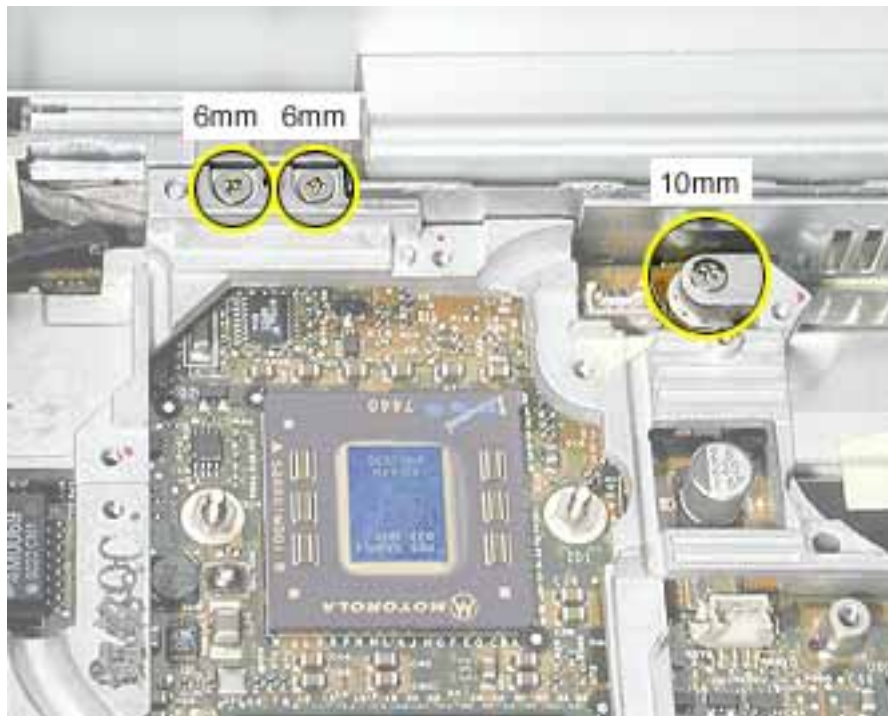
9. Tilt up the RJ11 modem cable board and remove the 6-mm long screw (not shown) that secures the frame to the logic board.



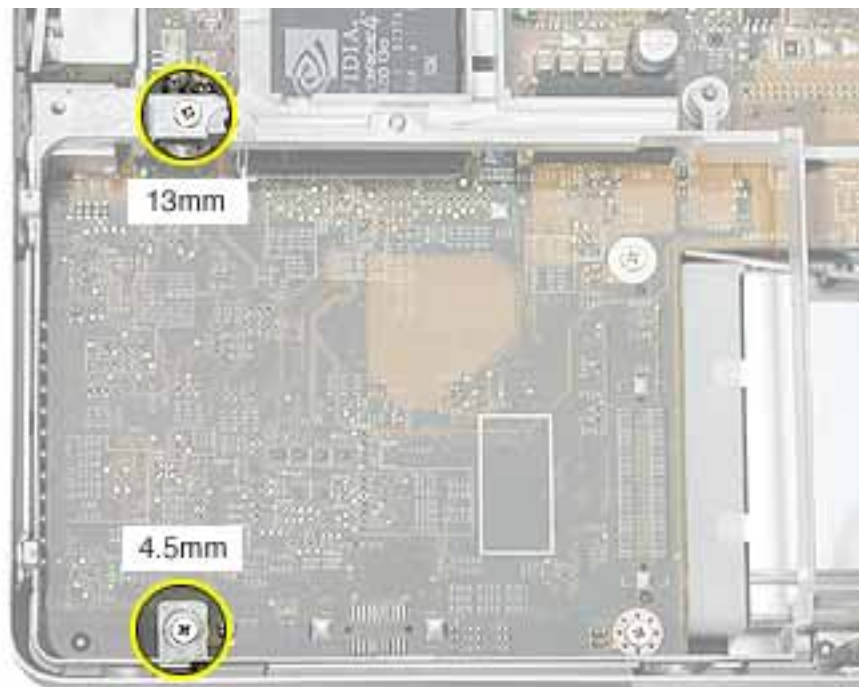
10. Remove the two screws at the I/O ports.
11. Remove the EMI strip at the top of the I/O ports.



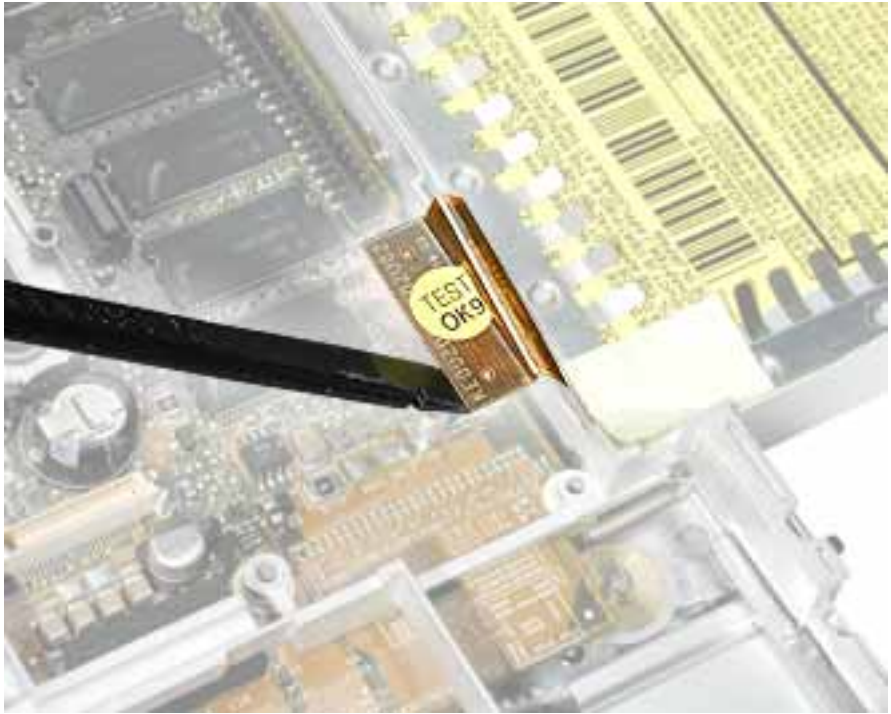
12. Remove the three screws from the top of the heatsink.



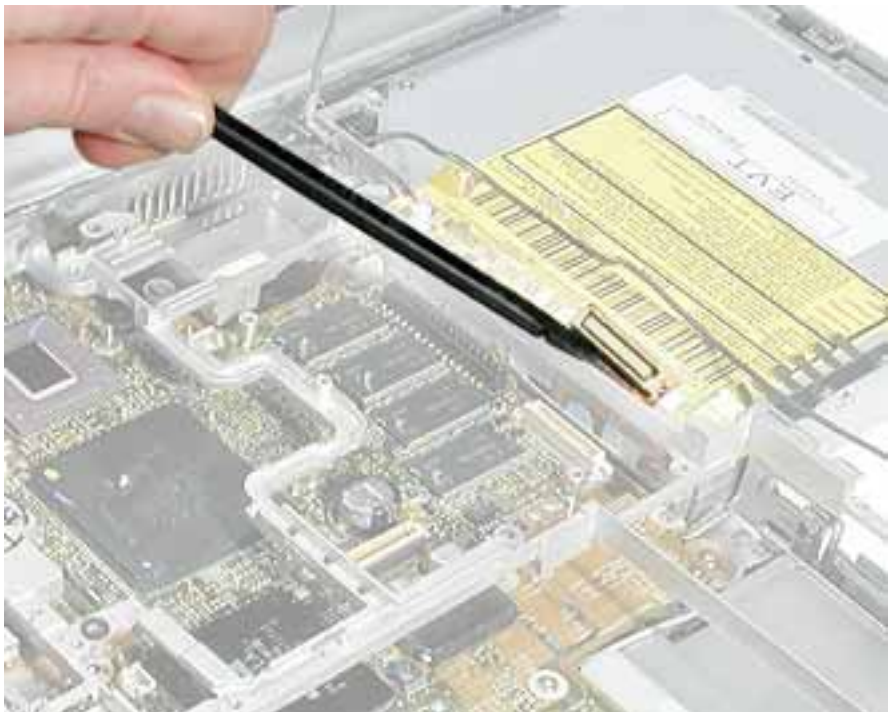
13. Remove the two screws from the lower left corner of the computer assembly.



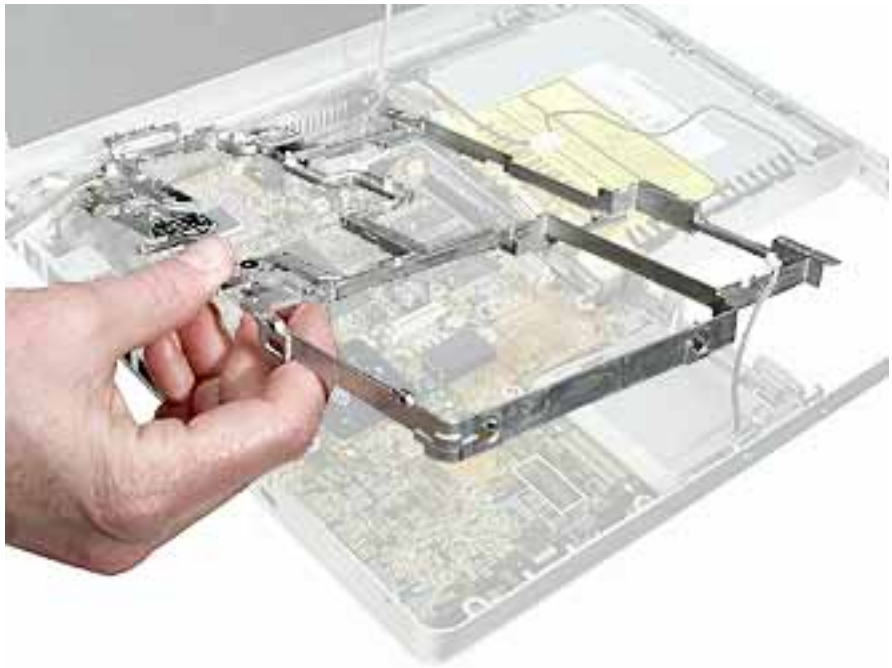
14. Disconnect the optical drive flex cable.



15. Lift up the frame, being careful where it catches on the optical drive flex cable or other cables.

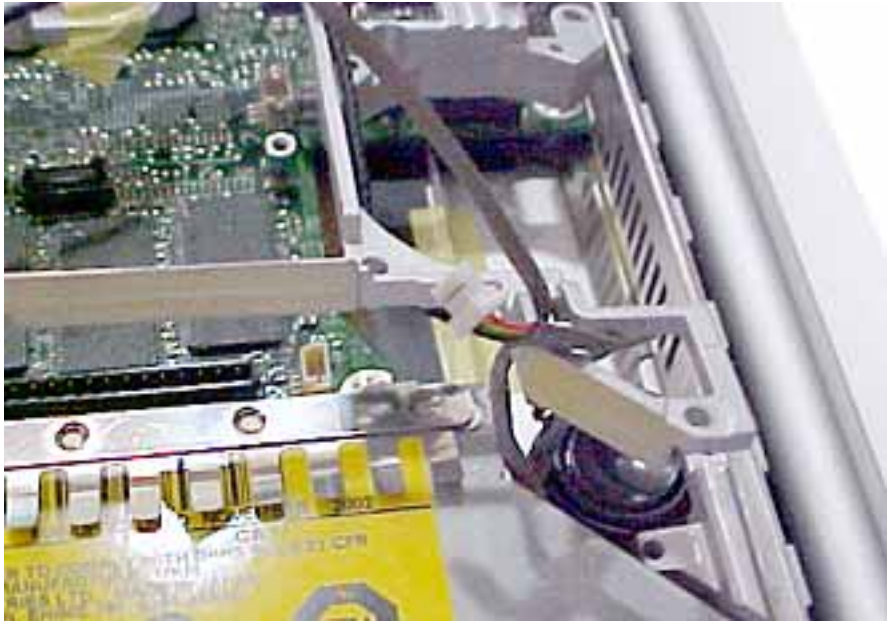


16. Lift the inner frame out of the computer assembly.



17. Install the replacement frame, and reassemble and test the computer.

Replacement Note: When installing the replacement frame, note the initial routing of the cables, as shown in the following images:





RJ11 Modem Board and Cable

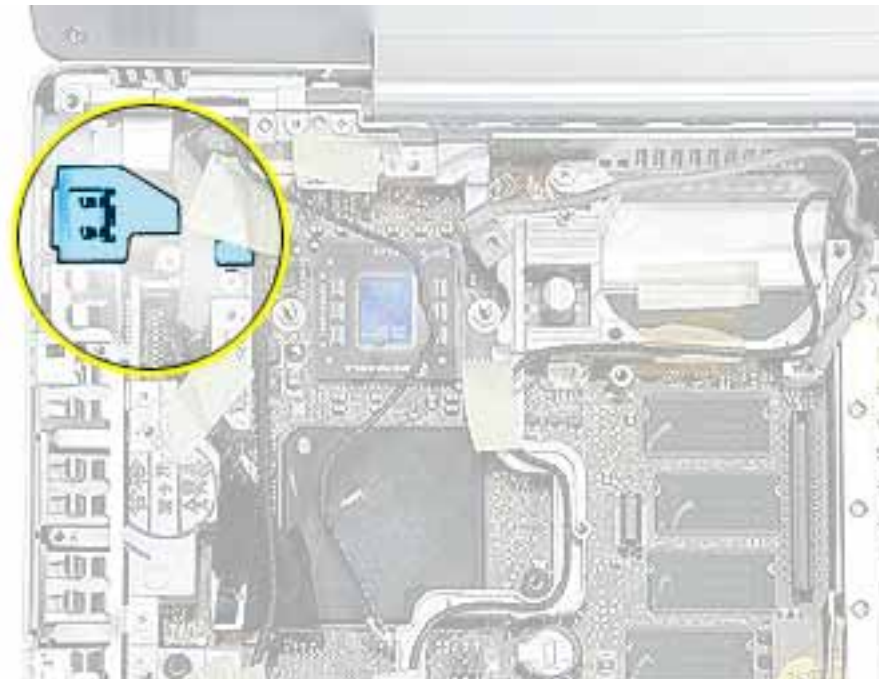
Tools

This procedure requires the following tools:

- #0 Phillips screwdriver
- Black stick (or other nonconductive nylon or plastic flat-blade tool)

Note: To organize the screws you remove from the computer, use a tray with divided compartments (such as a plastic ice cube tray).

Part Location



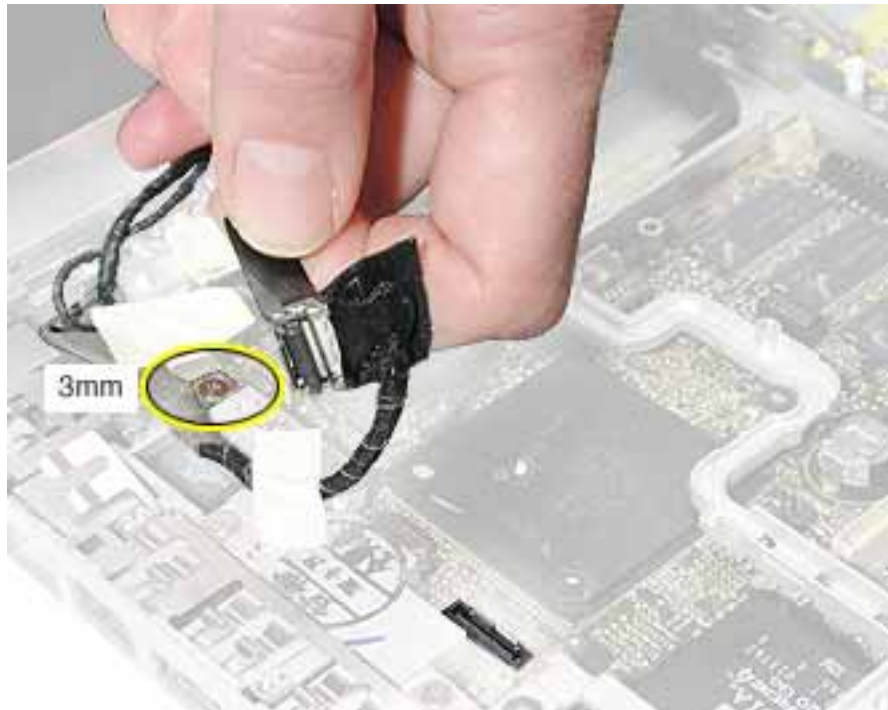
Preliminary Steps

Before you begin, remove the following:

- Battery
- Memory door and memory card
- Keyboard
- Top case

Procedure

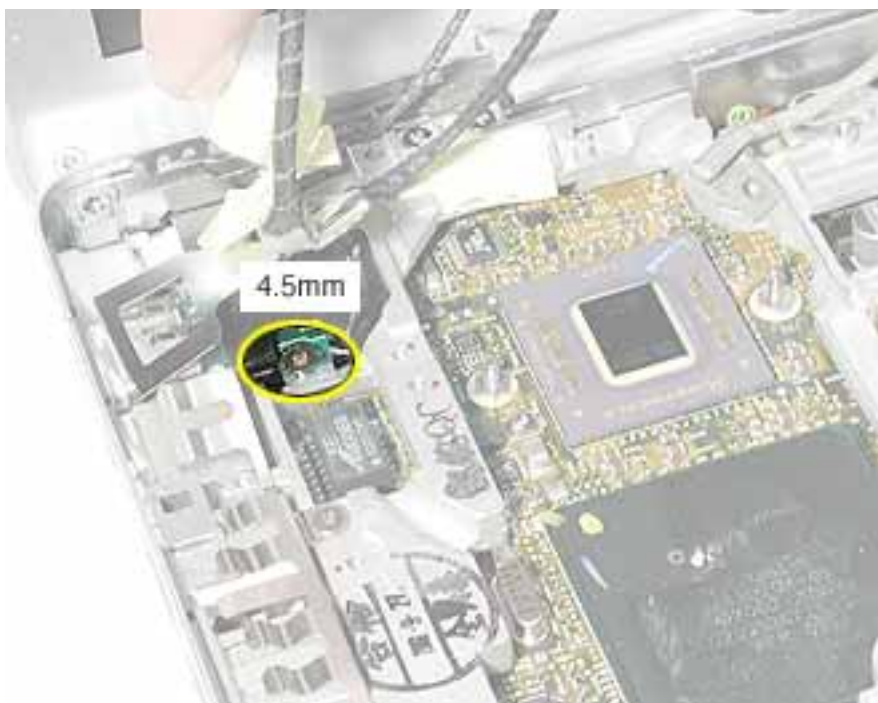
1. Disconnect the modem cable connector from the modem (Refer to the Modem procedure in this chapter. You do not have to remove the modem board to disconnect the cable.)
2. Remove the screw at the LVDS cable.



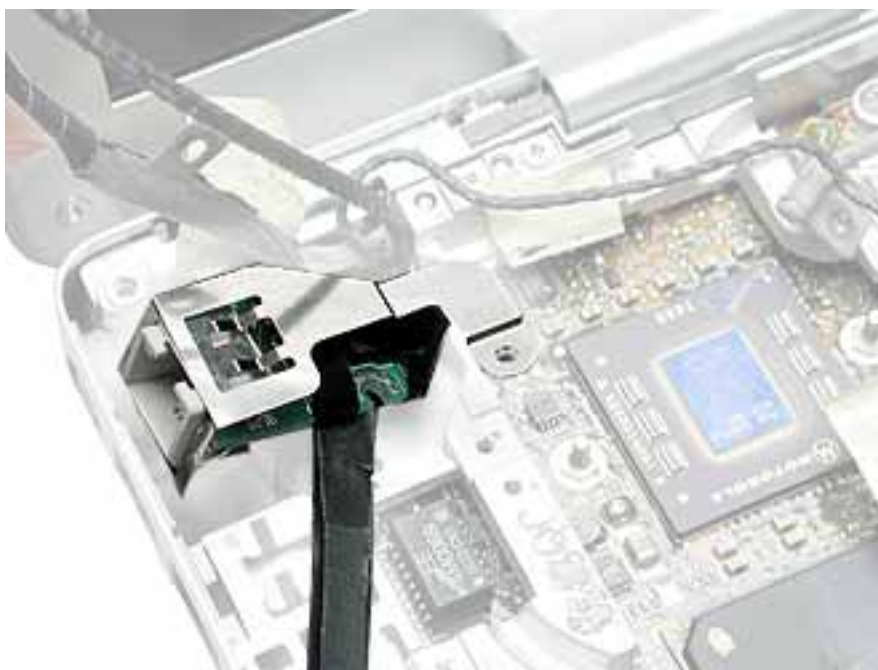
Replacement Note: When reinstalling the LVDS cable, tuck the pull tab under the frame.

3. Peel up the tape that secures the LVDS cable.

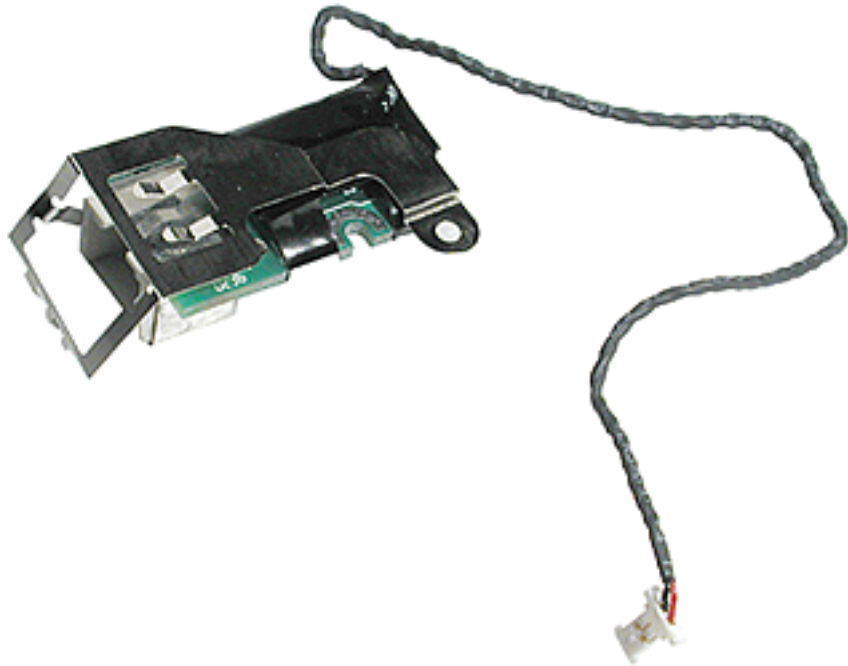
4. Remove the screw at the RJ11 board.



5. Use a black stick to tilt the RJ11 board and lift it out of the inner frame.



-
6. Remove the EMI shield from the RJ11 board. The board includes the attached cable and connector.



7. Install the replacement RJ11 modem board and cable, and reassemble and test the computer.



Sleep Light

Tools

This procedure requires the following tools:

- #0 Phillips screwdriver

Part Location



Preliminary Steps

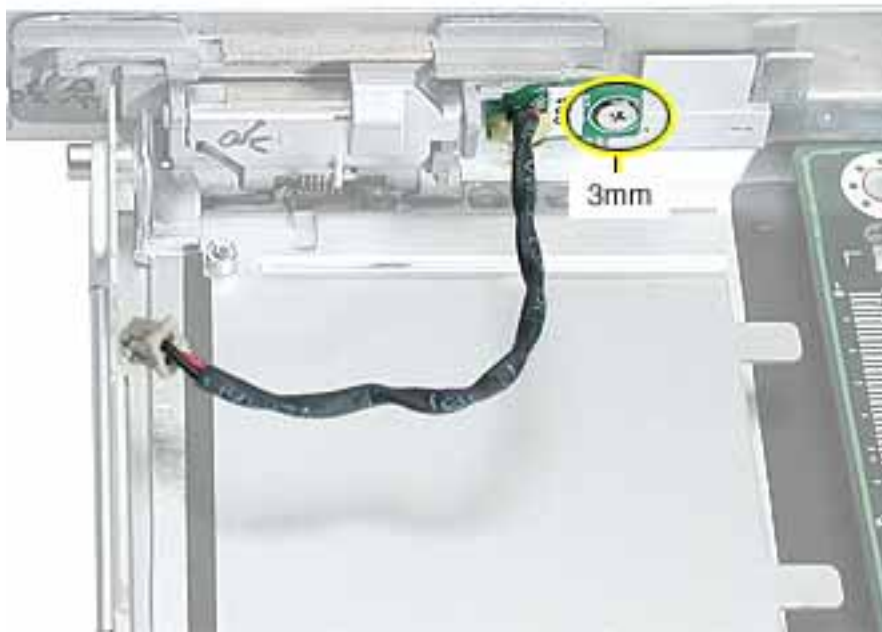
Before you begin, remove the following:

- Battery
- Memory door and memory card
- Keyboard
- Top case
- Reed switch
- Hard drive
- DC-to-DC board
- Modem
- Heatsink with fan

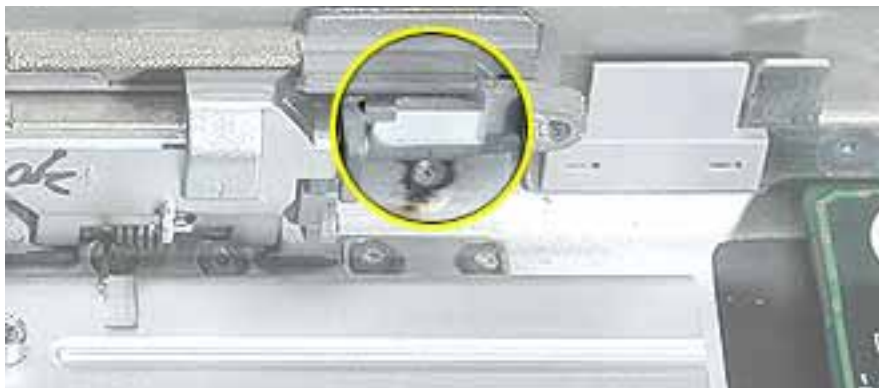
- RJ11 board
- Inner frame

Procedure

1. Remove the screw from the sleep light board.
2. Remove the board from the bottom case.



3. **Replacement Note:** Make sure the bottom case has the sleep light pipe installed before installing the replacement sleep light board.



4. Install the replacement sleep light board, and reassemble and test the computer.



Logic Board

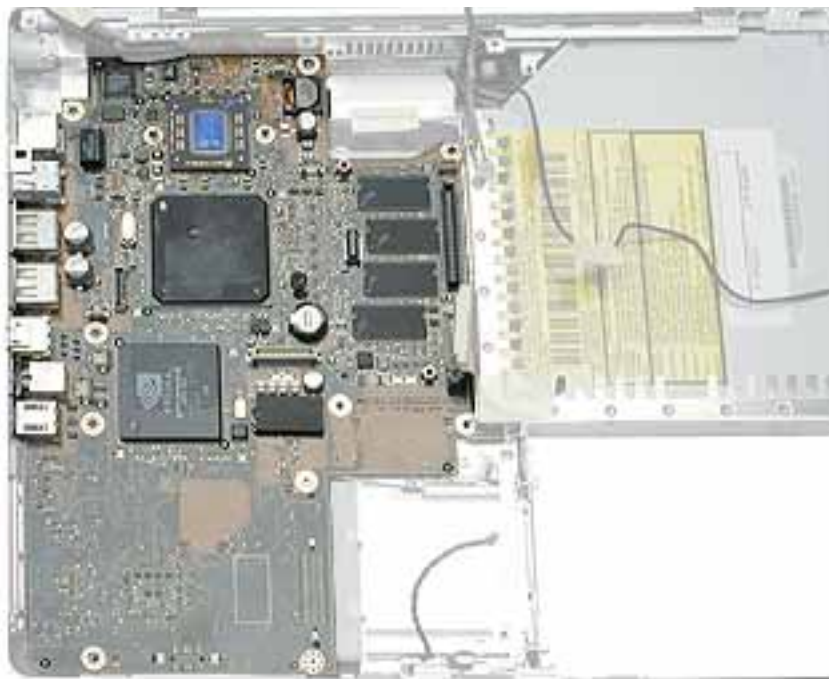
Tools

This procedure requires the following tools:

- #0 Phillips screwdriver
- Black stick (or other nonconductive nylon or plastic flat-blade tool)

Note: To organize the screws you remove from the computer, use a tray with divided compartments (such as a plastic ice cube tray).

Part Location



Preliminary Steps

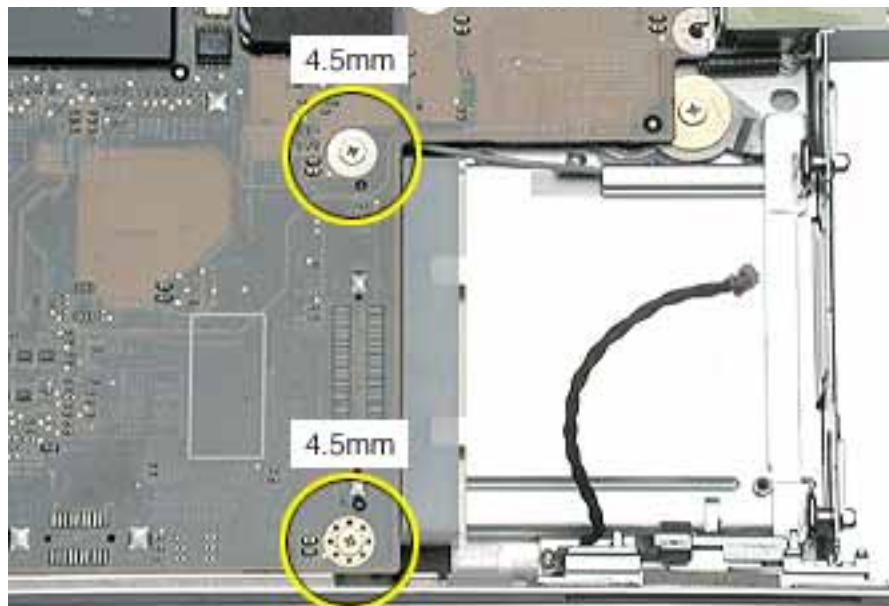
Before you begin, remove the following:

- Battery
- Memory door and memory card
- AirPort Extreme Card, if installed
- Keyboard
- Top case

- Reed switch
- Hard drive
- DC-to-DC board
- Modem
- Heatsink with fan
- RJ11 board
- Inner frame

Procedure

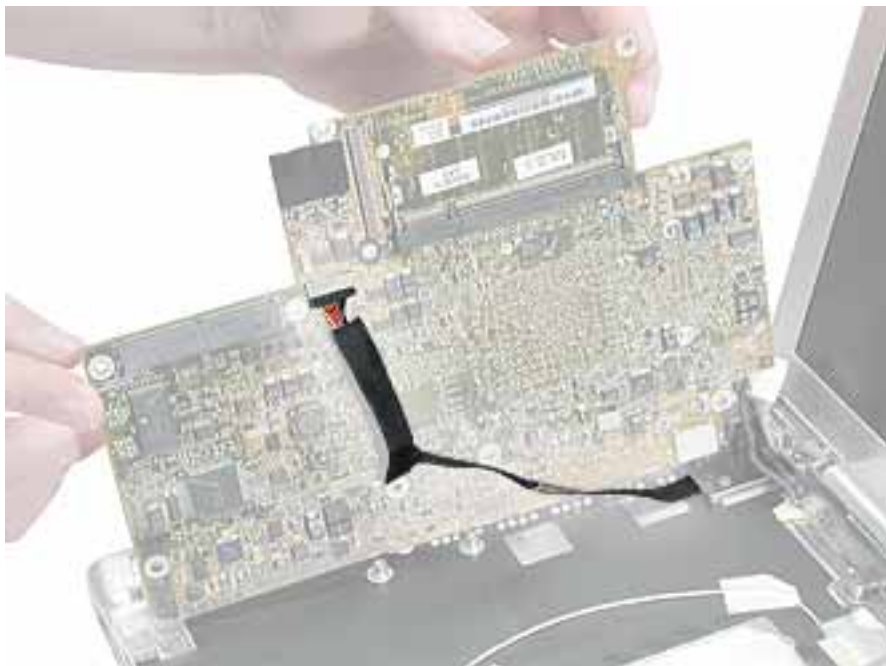
1. Remove the two screws near the right edge of the board.



2. Holding the edges of the board tilt up the logic board.

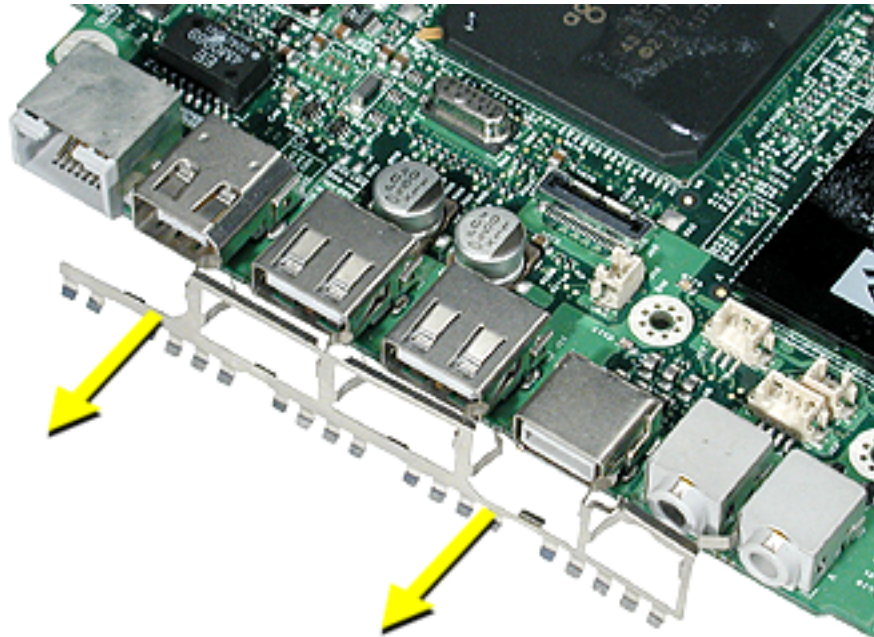


3. While holding the board vertically, disconnect the DC-in connector cable from the underside of the logic board.



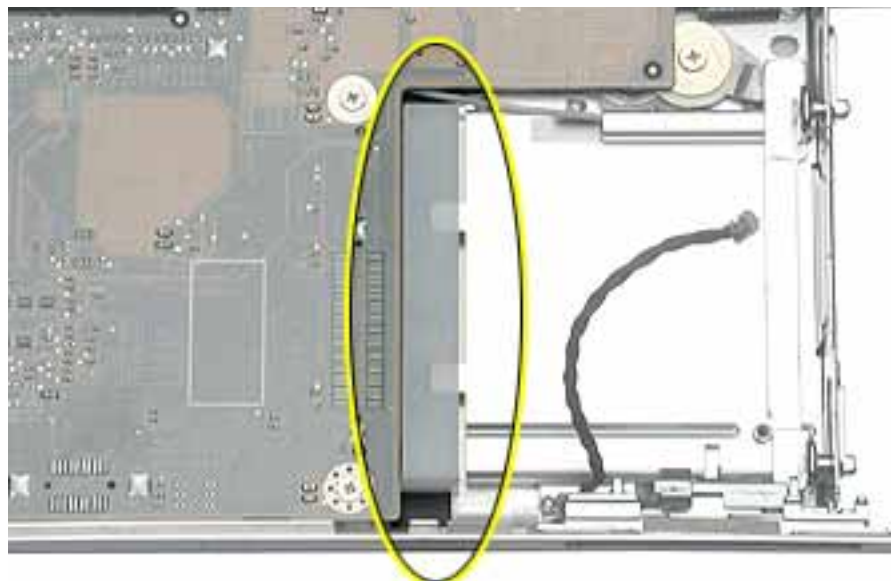
4. Remove the side EMI shield from the I/O ports.

Warning: When installing the EMI shield over the logic board ports, make sure that the shield fits loosely and the ports are not obstructed.



5. Install the replacement logic board, and reassemble and test the computer.

Replacement Note: Before securing the replacement logic board in the bottom case, make sure the white plastic wireless guide is fitted against the AirPort Extreme Card carrier in the bottom case. (The wireless guide requires no screws to hold it in place.)





DC-In Board

This procedure requires the following tools:

- #0 Phillips screwdriver
- Black stick (or other nonconductive nylon or plastic flat-blade tool)

Part Location



Preliminary Steps

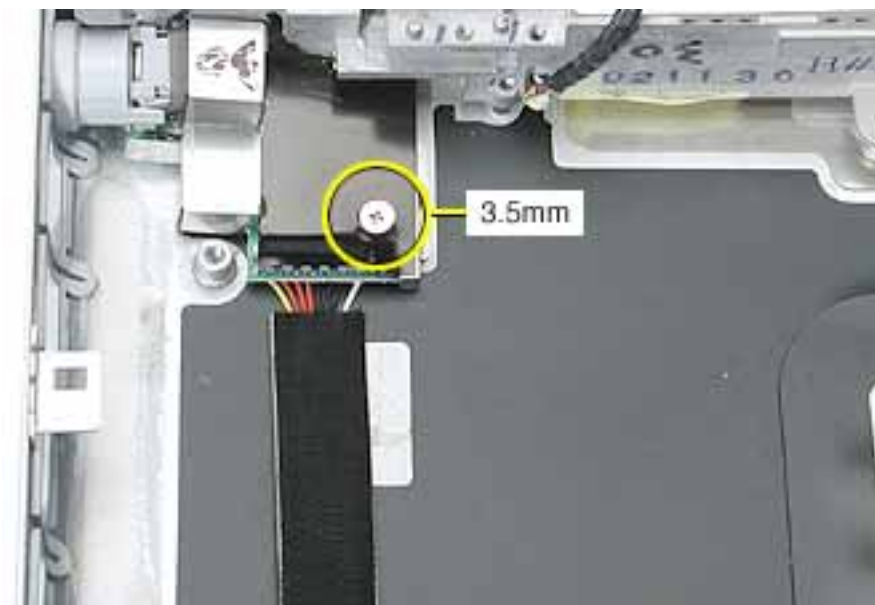
Before you begin, remove the following:

- Battery
- Memory door and memory card
- AirPort Extreme Card, if installed
- Keyboard
- Top case
- Reed switch
- Hard drive
- DC-to-DC board
- Modem

- Heatsink with fan
- RJ11 board
- Inner frame
- Logic board

Procedure

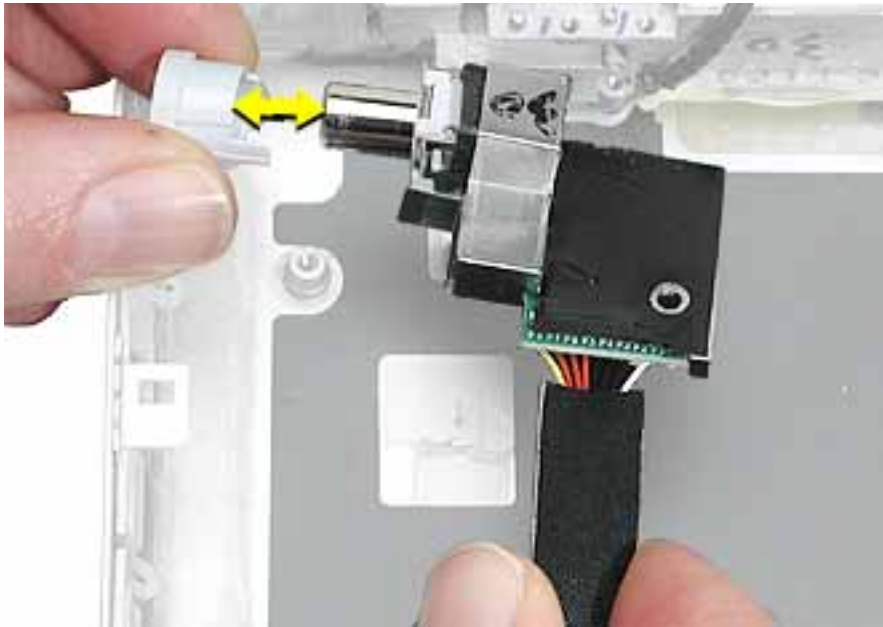
1. Hold the DC-in board in place as you remove the screw that attaches the board to the bottom case.



2. Pull the flat cable up from the adhesive on the bottom case.
3. Pull the board away from the side of the bottom housing. Use a black stick to lift up the board, if necessary.



4. Remove the round port liner.



5. Install the replacement DC-in board, and reassemble and test the computer.



Optical Drive

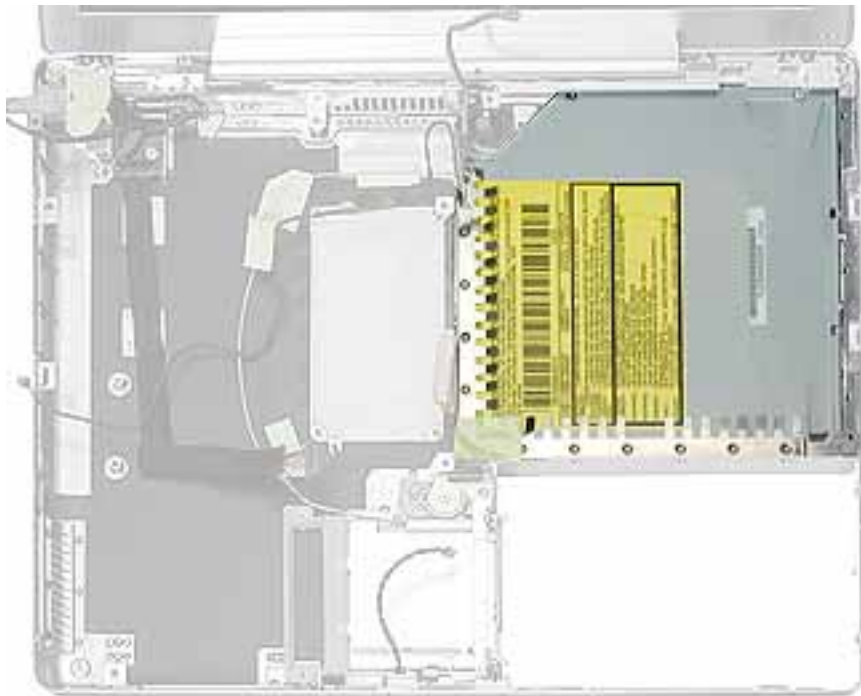
Tools

This procedure requires the following tools:

- #0 Phillips screwdriver
- Black stick (or other nonconductive nylon or plastic flat-blade tool)

Note: To organize the screws you remove from the computer, use a tray with divided compartments (such as a plastic ice cube tray).

Part Location



Preliminary Steps

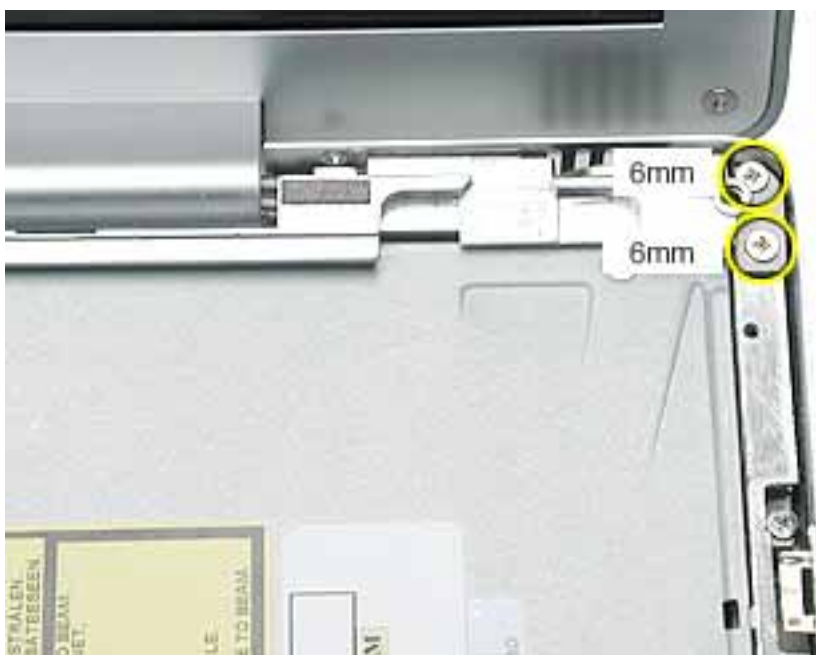
Before you begin, remove the following:

- Battery
- Memory door and memory card
- AirPort Extreme Card, if installed
- Keyboard

- Top case
- Reed switch
- Hard drive
- DC-to-DC board
- Modem
- Heatsink with fan
- RJ11 board
- Inner frame
- Logic board

Procedure

1. Remove the two screws from the shoulder bracket at the upper right corner of the optical drive.



2. Use a black stick to remove the shoulder bracket.



3. Remove the two screws from the slot load bezel.

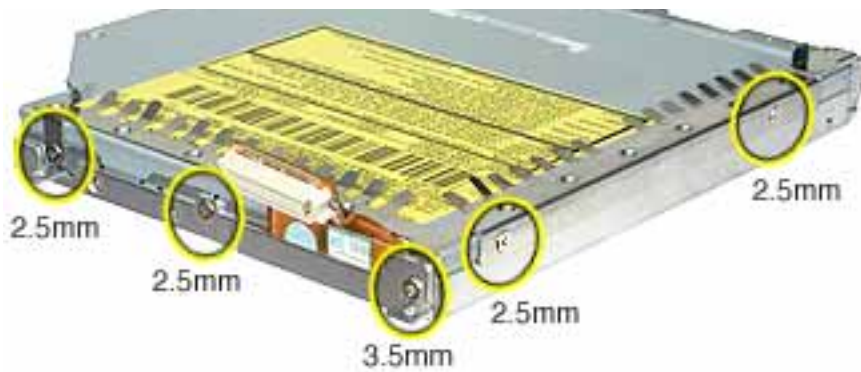
Replacement Note: When installing the replacement optical drive in the bottom case, make sure the slot load bezel is flush against the slot in the side of the bottom case before installing the screws.



4. Tilt up the optical drive and remove it from the computer.



5. Remove the screws from the L-shaped EMI bracket on the top of the drive. Lift off the bracket.



6. Turn over the drive and remove the three screws from the L-shaped EMI bracket on the bottom of the drive.



7. Remove the bottom L-shaped EMI bracket.



8. Use a black stick to press the tabs and remove the slot load bezel. Pull the bezel straight off the drive.



9. Disconnect the flex cable.



10. Install the replacement optical drive, and reassemble and test the computer.



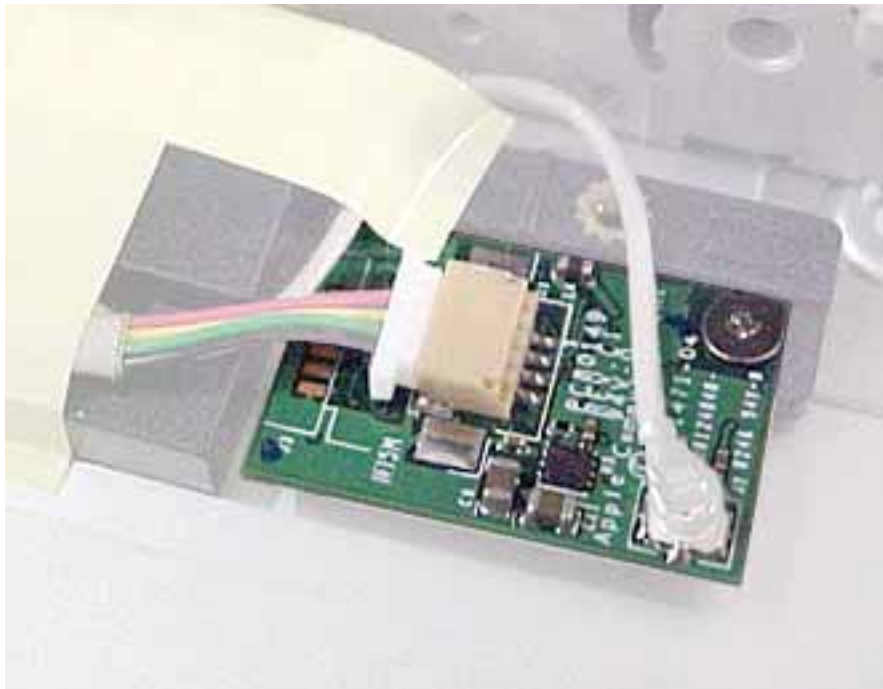
Bluetooth

Tools

This procedure requires the following tools:

- #0 Phillips screwdriver
- Black stick (or other nonconductive nylon or plastic flat-blade tool)

Part Location



Preliminary Steps

Before you begin, remove the following:

- Battery
- Memory door and memory card
- AirPort Extreme Card, if installed
- Keyboard
- Top case
- Reed switch
- Hard drive

- DC-to-DC board
- Modem
- Heatsink with fan
- RJ11 board
- Inner frame
- Logic Board
- Optical drive

Procedure

Warning: The subwoofer, located to the left of the Bluetooth board, is a sensitive device. Avoid touching the subwoofer as you perform this procedure.

Warning: To avoid excessive pressure on the Bluetooth board, hold the edge of the board in place as you perform this procedure.

1. If tape covers part of the board, hold the board in place as you remove the tape.
2. Use a black stick to disconnect the 4-pin connector from the board.
3. Holding the Bluetooth cable connector, pull it straight up to disconnect it.
4. Remove the screw from the Bluetooth board.



5. Remove the Bluetooth board from the bottom case.
6. Install the replacement Bluetooth, and reassemble and test the computer.



Subwoofer

Tools

This procedure requires the following tools:

- #0 Phillips screwdriver
- Black stick (or other nonconductive nylon or plastic flat-blade tool)

Part Location



Note: In the image above, the Bluetooth cable appearance differs from the production models of this computer.

Procedure

Note: Refer to the "Display Module" procedure. You can remove the subwoofer while it is still in the bottom case (and before removing the display) by removing the tape and the single screw from the subwoofer.



Display Module

Tools

This procedure requires the following tools:

- #0 Phillips screwdriver
- #1 Phillips screwdriver
- Black stick (or other nonconductive nylon or plastic flat-blade tool)

Note: To organize the screws you remove from the computer, use a tray with divided compartments (such as a plastic ice cube tray).

Part Location



Preliminary Steps

Before you begin, remove the following:

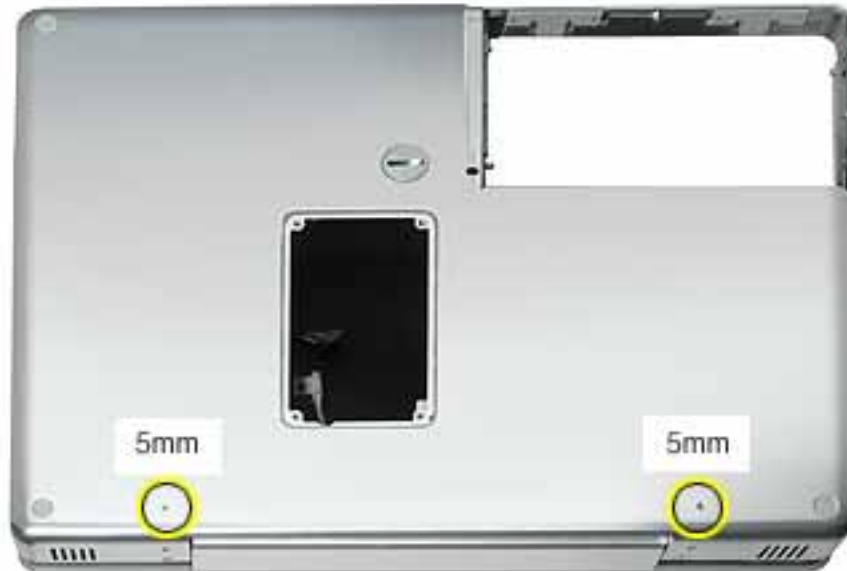
- Battery
- Memory door and memory card
- AirPort Extreme Card, if installed
- Keyboard

- Top case
- Reed switch
- Hard drive
- DC-to-DC board
- Modem
- Heatsink with fan
- RJ11 board
- Inner frame
- Logic Board
- Optical drive
- Bluetooth
- DC-in board

Procedure

Important: This procedure shows the subwoofer and inner rear panel attached to the display module when it is removed from the bottom case. However, you can remove the subwoofer from the bottom case you do not need to remove the subwoofer and display module together.

1. With the computer upside down, remove the two screws from the bottom case.



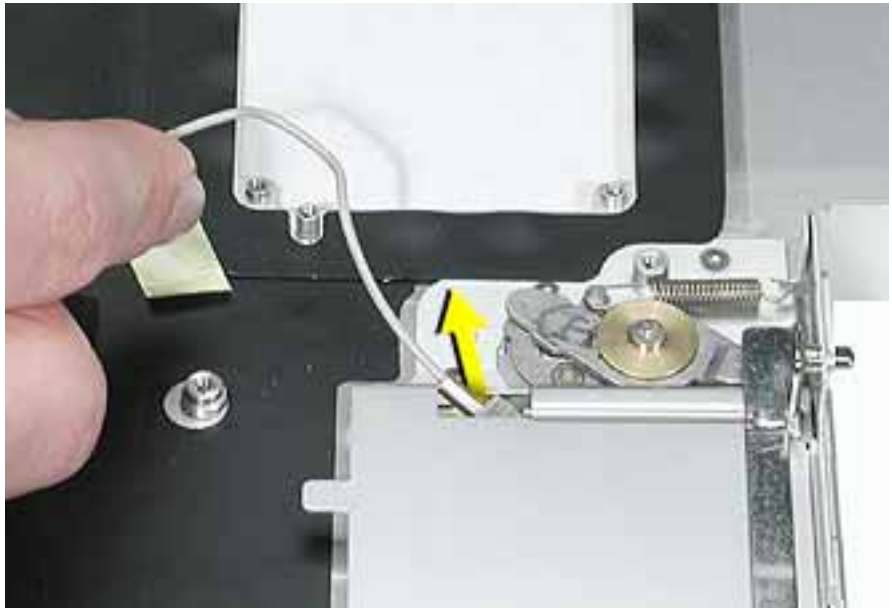
2. Remove the screws near the display hinge.



3. From the inside of the bottom case, remove the tape from the antenna cable.



4. Route the AirPort antenna cable through the AirPort Extreme Card bay.



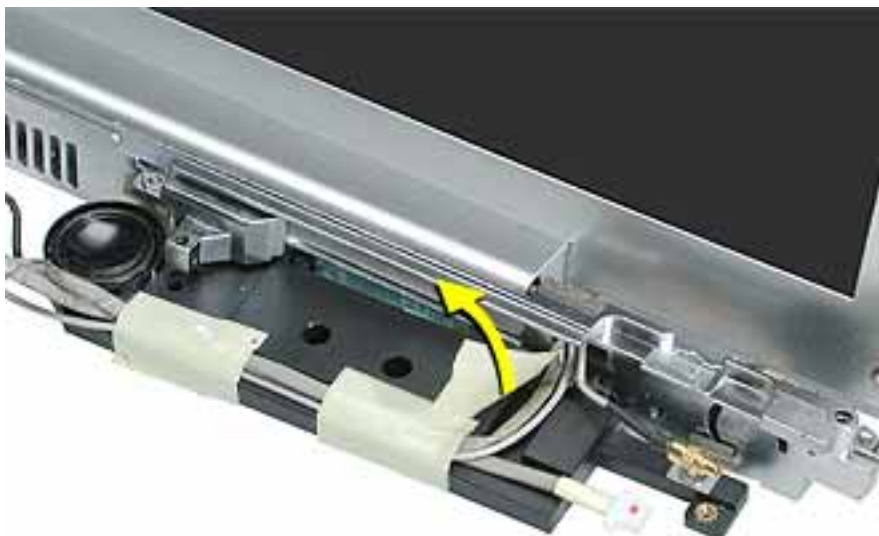
5. Remove the screw from the subwoofer.



Note: In the image above, the Bluetooth cable appearance differs from the production models of this computer.

6. Peel the tape off of the subwoofer.

Warning: The cone of the subwoofer is a sensitive device. Avoid touching the subwoofer cone as you perform this procedure.



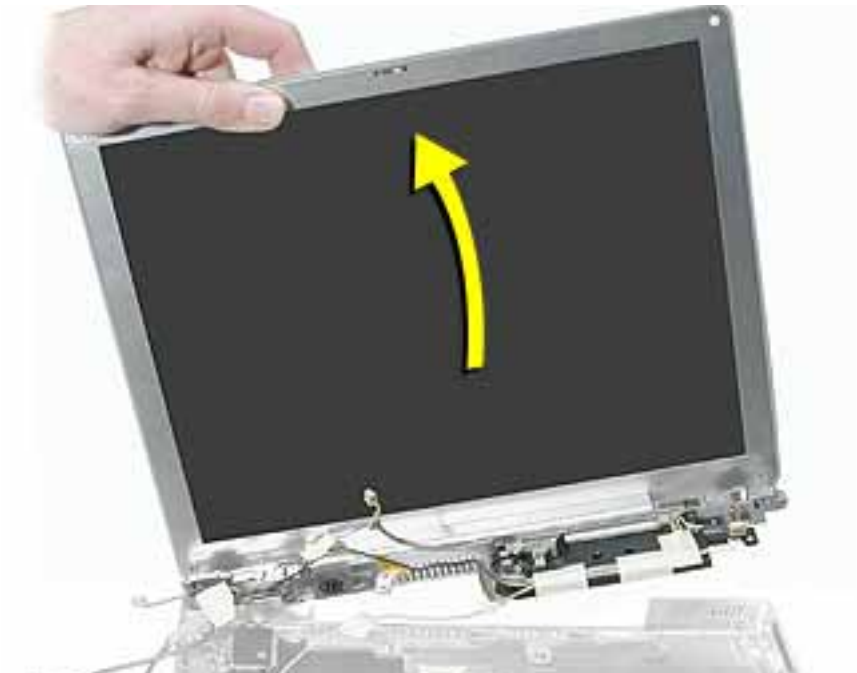
Note: In the image above, the Bluetooth cable appearance differs from the production models of this computer.

7. **Note:** The back edge of the subwoofer adheres to the rear panel.

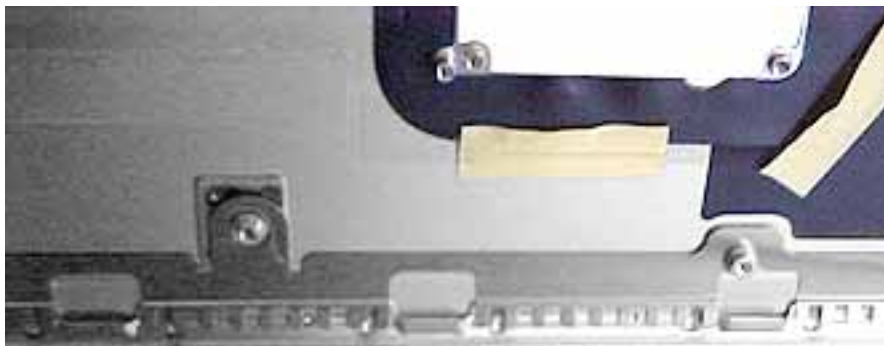
Use a black stick to pry open the adhesive seal at the rear panel. Pivot the subwoofer away from the rear panel, and remove the subwoofer from the bottom case.



8. With the display open to a 90-degree angle, lift off the display with attached subwoofer and inner rear frame.



Important: The display might get caught on the hooks (shown below) on the bottom case. If so, carefully reposition the display so it is laying face up with the attached bottom case standing vertically. Gently twist the bottom case to release it from the display.



9. Remove the four screws from the display's inner rear panel. Make sure the screwdriver does not touch the speakers.



10. Remove the inner rear panel with attached speakers by routing the cables through the slots in the rear panel.

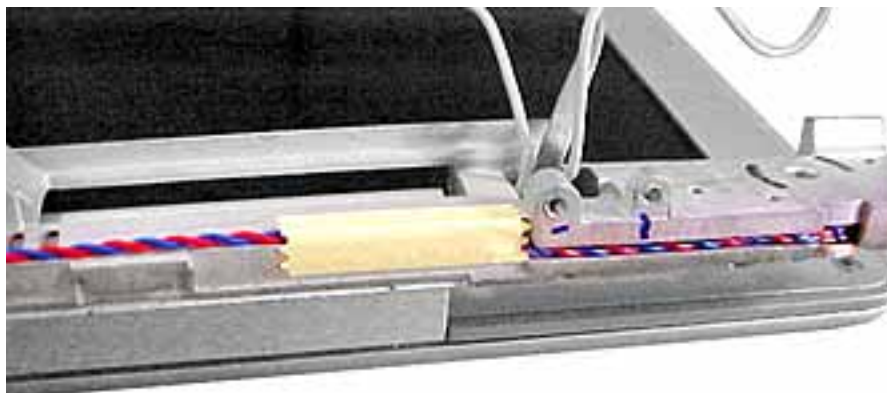
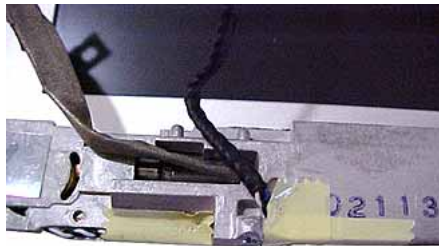
Replacement Note: When installing the rear panel, hold the routed cables away from the path of the screws.



Replacement Note: When installing the rear panel, check that the twisted pair of speaker cables is completely recessed in the panel and that the tape holds the cables in place.



Replacement Note: Check that the orientation of the cables directed through the rear panel openings are as shown below:



11. Install the replacement display module, and reassemble and test the computer.





Bottom Case

Part Location



Preliminary Steps

Before you begin, remove the following:

- Battery
- Memory door and memory card
- AirPort Extreme Card, if installed
- Keyboard
- Top case
- Reed switch
- Hard drive
- DC-to-DC board
- Modem
- Heatsink with fan
- RJ11 board
- Inner frame
- Sleep light board
- Logic board

-
- DC-in board
 - Optical drive
 - Bluetooth
 - Subwoofer
 - Display module

Procedure

When all preliminary steps are performed, the bottom case is the part that remains.



Display Housing

Tools

This procedure requires the following tools:

- 1.5 mm hex driver
- Black stick (or other nonconductive nylon or plastic flat-blade tool)
- Optional: Credit card (or other thin plastic card)

Part Location



Preliminary Steps

Before you begin, remove the following:

- Battery
- Memory door and memory card
- AirPort Extreme Card, if installed
- Keyboard
- Top case
- Reed switch

- Hard drive
- DC-to-DC board
- Modem
- Heatsink with fan
- RJ11 board
- Inner frame
- Logic board
- DC-in board
- Optical drive
- Display module

Procedure

1. Remove the two 5-mm long hex screws from the front bezel.



2. Use a black stick or thin plastic credit card around the outer edge of the bezel to separate the display housing tabs from the display assembly.

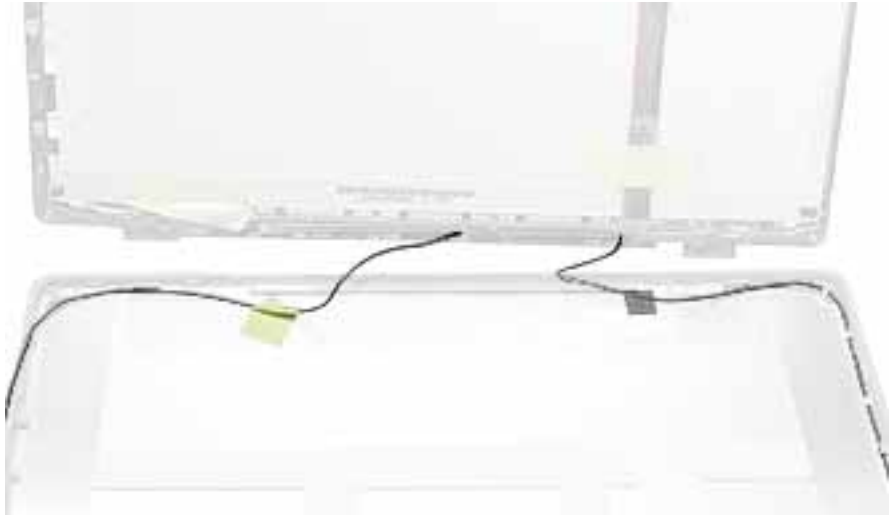
Warning: To avoid damage to the antenna receptors or inner cables, do not poke the black stick or credit card inside the display. Keep the tool at a nearly horizontal plane with the display bezel as you loosen the display assembly from the display housing.



Note: In the image above, the Bluetooth cable appearance differs from the production models of this computer.

3. Lift the display assembly off of the display housing.
4. Note the routing of the antenna cables. Peel up the tape that holds the cables in place.

Warning: Handle the antenna receptors and cables with care. Do not strain or pinch the cables. Do not apply pressure to or bend the antenna receptors.

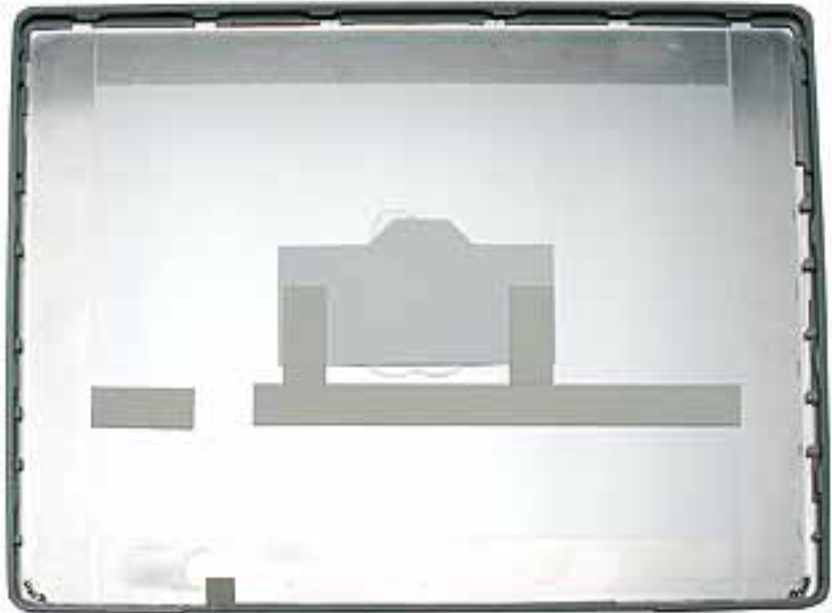


5. Disconnect the antenna cables and receptors on each side of the display housing.

Warning: The hooks that hold the antenna cables in place are delicate. Use care when disconnecting the cables.



-
6. Remove the display housing.



7. Install the replacement display housing, and reassemble and test the computer.



LCD Panel

Tools

This procedure requires the following tools:

- Phillips #0 screwdriver
- Black stick or other nonconductive plastic or nylon tool

Part Location



Preliminary Steps

Before you begin, remove the following:

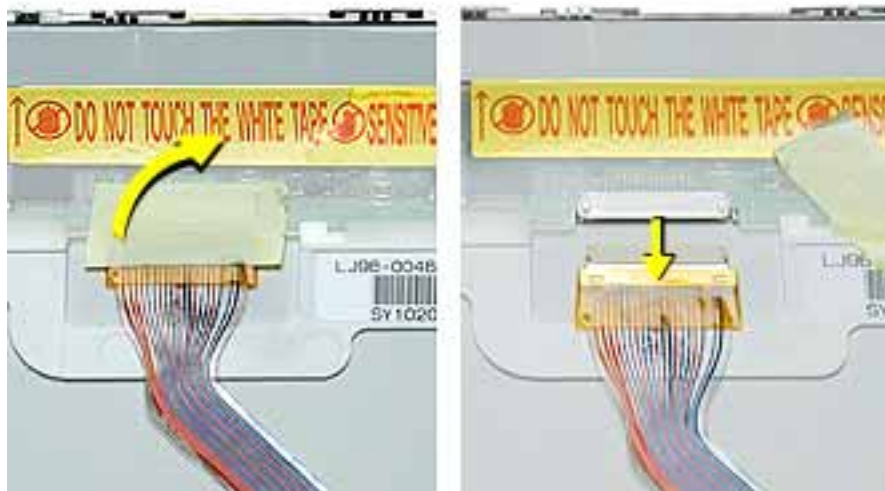
- Battery
- Memory door and memory card
- AirPort Extreme Card, if installed
- Keyboard
- Top case
- Reed switch
- Hard drive

- DC-to-DC board
- Modem
- Heatsink with fan
- RJ11 board
- Inner frame
- Logic board
- DC-in board
- Optical drive
- Display module
- Display housing

Procedure

Note: Reuse the tape you remove from the LCD panel.

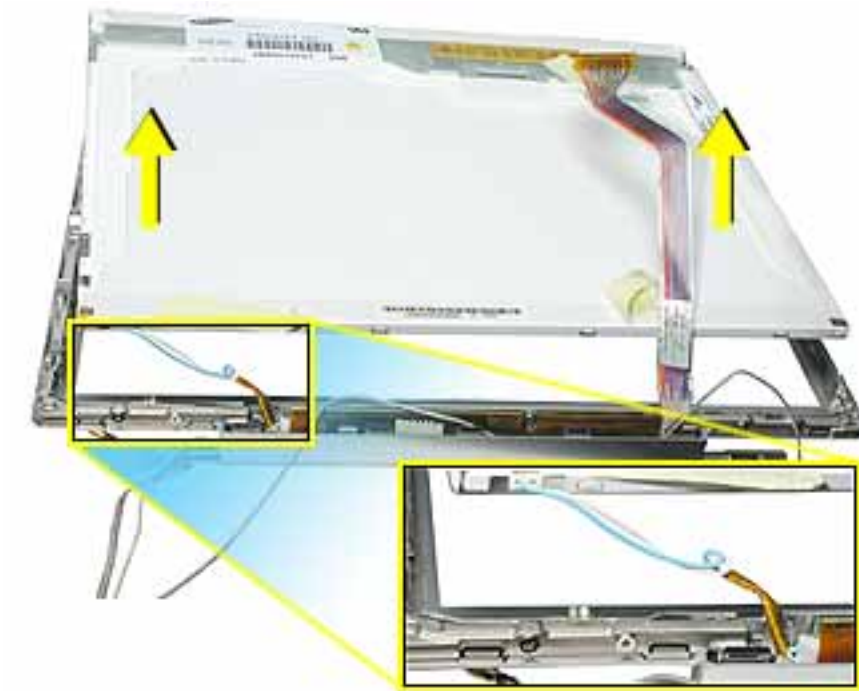
1. Hold the backing for the LCD panel in place as you peel off the tape and disconnect the LCD cable.



2. Remove the two screws from each side of the LCD panel.

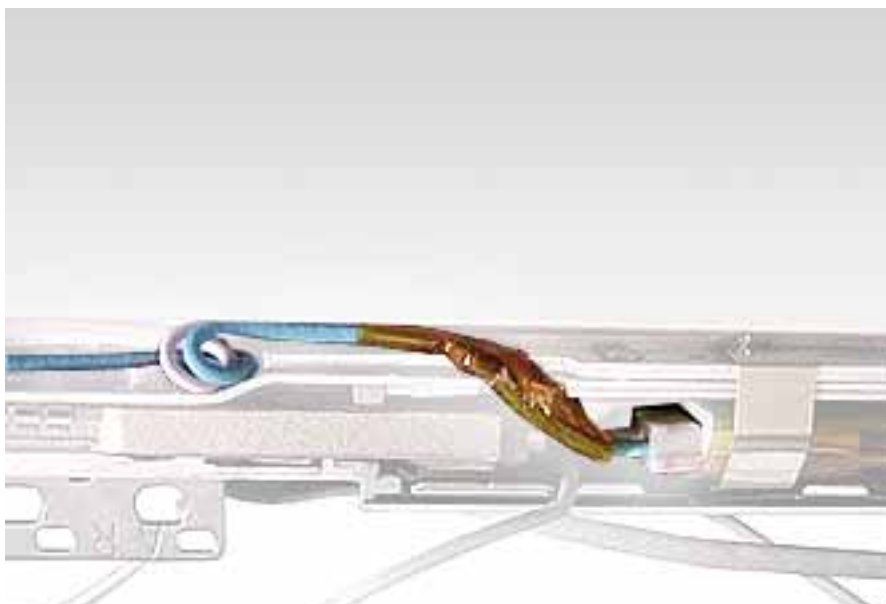


3. Lift off the long EMI clip at the base of the bezel.
4. Raise up the LCD panel and disconnect the connector to the inverter board.



5. Install the replacement LCD panel, and reassemble and test the computer.

Replacement Note: When installing the replacement LCD panel in the display bezel assembly, make sure the cable is connected to the inverter board and routed as shown.





Inverter Board (and Antenna Cable Assembly)

Tools

This procedure requires the following tools:

- Phillips #0 screwdriver
- Black stick or other nonconductive plastic or nylon tool

Note: To organize the screws you remove from the computer, use a tray with divided compartments (such as a plastic ice cube tray).

Part Location



Preliminary Steps

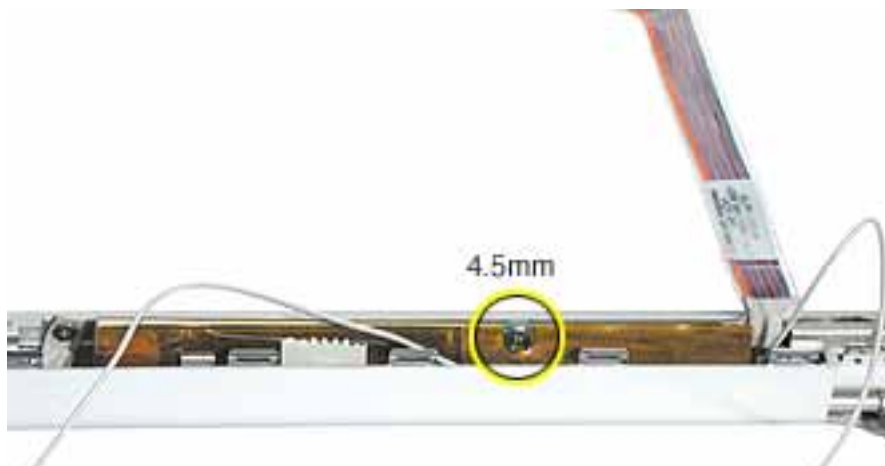
Before you begin, remove the following:

- Battery
- Memory door and memory card
- AirPort Extreme Card, if installed
- Keyboard
- Top case
- Reed switch

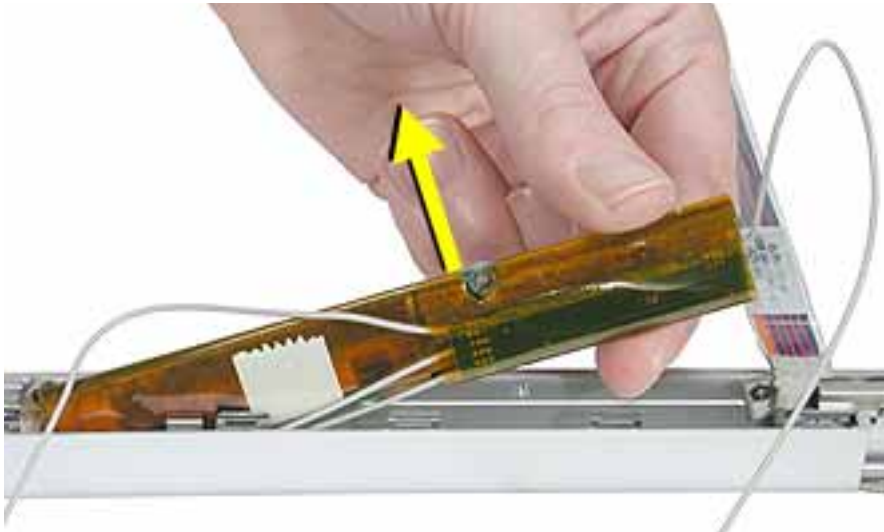
- Hard drive
- DC-to-DC board
- Modem
- Heatsink with fan
- RJ11 board
- Inner frame
- Logic board
- DC-in board
- Optical drive
- Display module
- Display housing
- LCD panel

Procedure

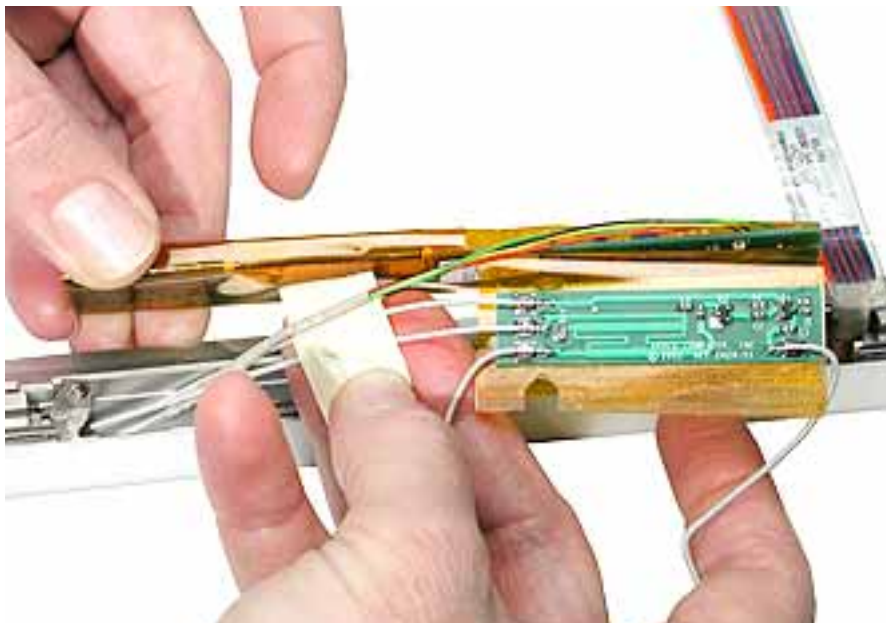
1. Remove the single screw near the center of the inverter board.



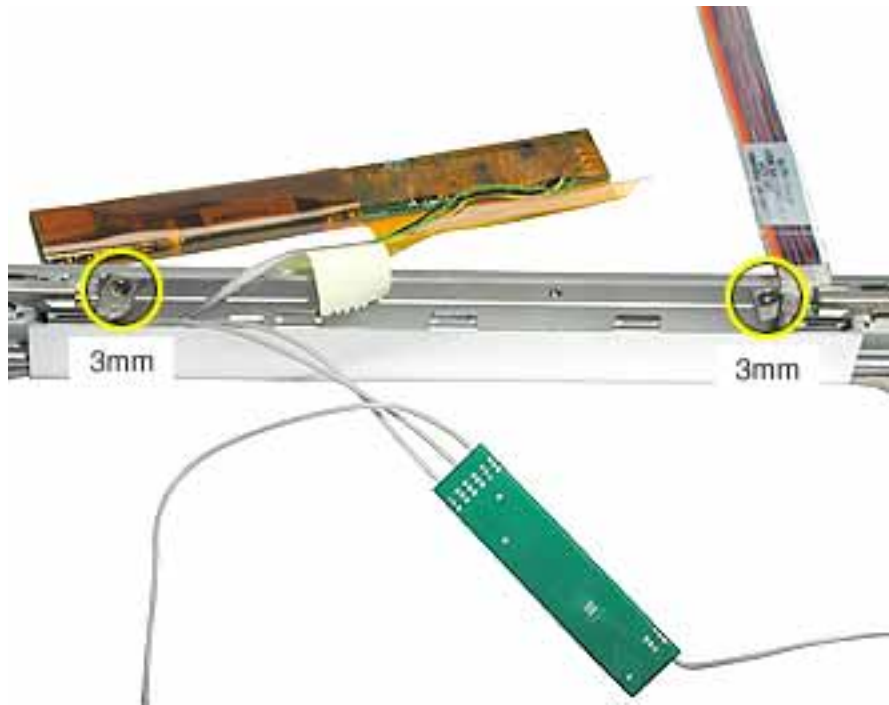
2. Lift up the board.



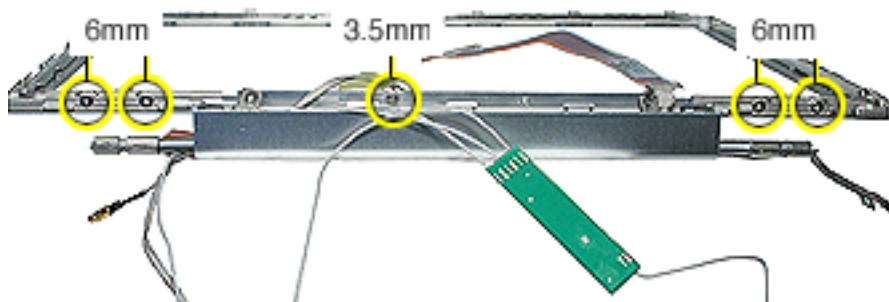
3. Peel away the tape and mylar cover that holds the inverter board and the antenna cable assembly together.



4. Separate the antenna cable assembly (board with attached antenna cables and Bluetooth cable) from the inverter board.
5. Remove the screws from the clutch cover.



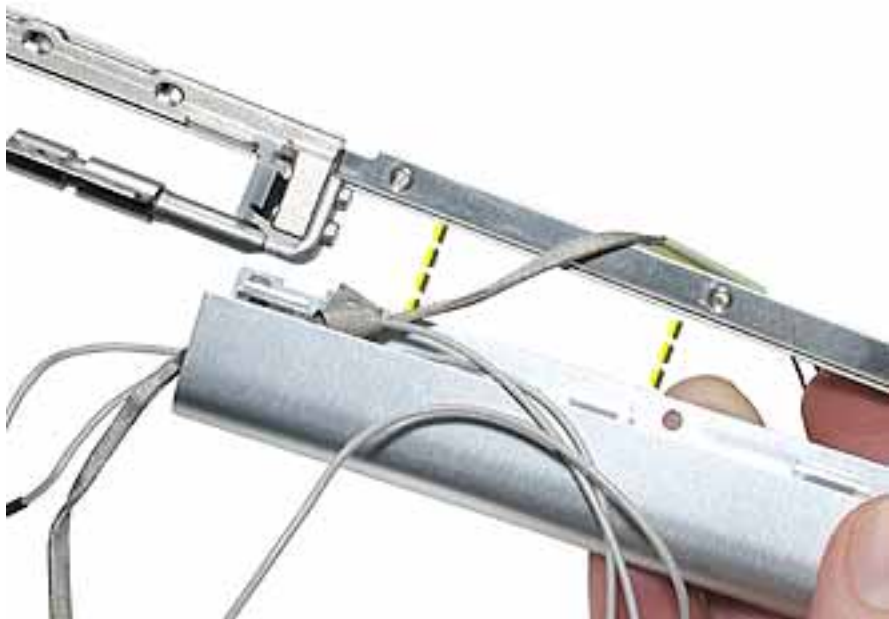
6. Remove the five screws from the bottom edge of the display bezel



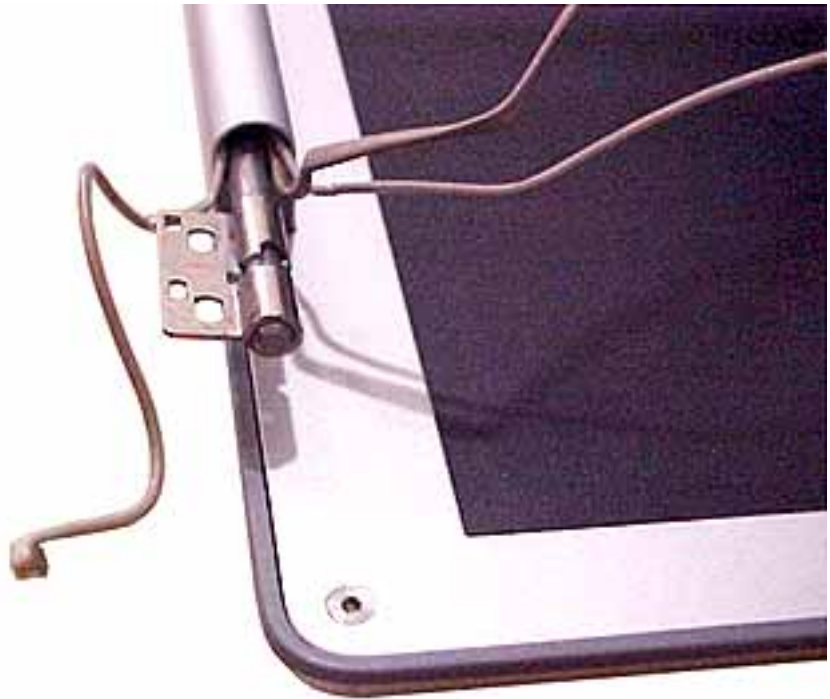
7. Separate the clutch cover from the bezel and remove the LVDS cable.



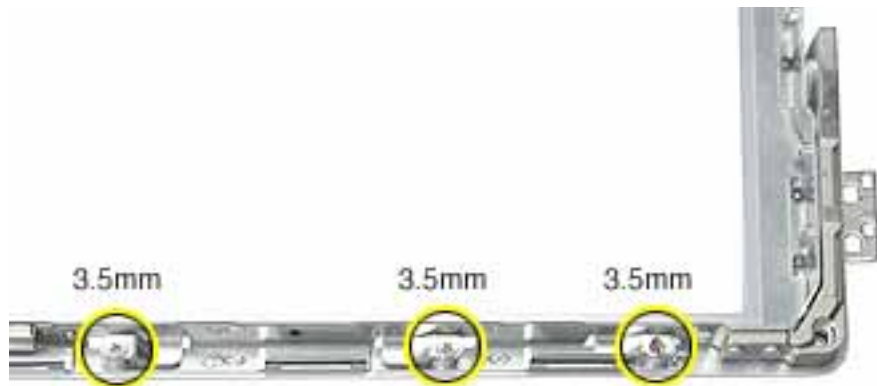
8. Remove the antenna cables and inverter from the clutch cover.



Replacement Note: When reinstalling the clutch cover, check that the cables are routed as shown below (Bluetooth cable on the bottom of the clutch):

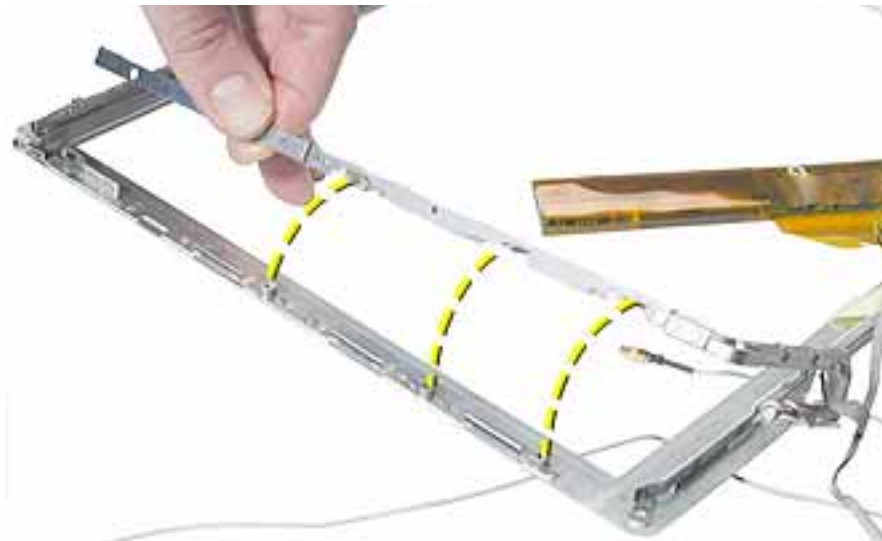


9. From the left side of the bezel, remove the three screws.



10. **Important:** In the following steps, note that because of the position of the bezel, the designation of right and left differs. For example, the right hinge with bezel brace is removed from the left side of the bezel because you are viewing the bezel from its inner side. Likewise, the left hinge with bezel brace is removed from the right side of the bezel.

Remove the right hinge with bezel brace from the left side of the bezel.



11. From the right side of the bezel, slide out the left hinge with bezel brace (no screws on this side).



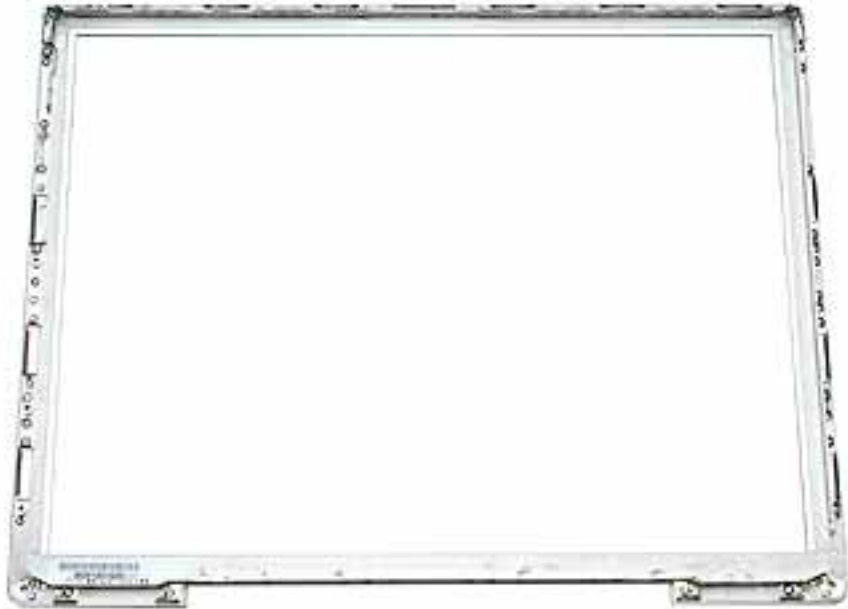
Replacement Note: To distinguish the right hinge with bezel brace from the left hinge with bezel brace, note that the right hinge has three flanges on the outer edge for the three screws.





Display Bezel

Part Location



Preliminary Steps

Before you begin, remove the following:

- Battery
- Memory door and memory card
- AirPort Extreme Card, if installed
- Keyboard
- Top case
- Reed switch
- Hard drive
- DC-to-DC board
- Modem
- Heatsink with fan
- RJ11 board
- Inner frame
- Logic board
- DC-in board

-
- Optical drive
 - Display module
 - Display housing
 - LCD panel
 - Inverter (and antenna cable assembly)

Procedure

When all preliminary steps are performed, the display bezel is the part that remains.



Troubleshooting
PowerBook G4 (12-inch)



Symptom Charts

How to Use the Symptom Charts

The Symptom Charts included in this chapter will help you diagnose specific symptoms related to the product.

The steps to solve a symptom are listed sequentially. You might not need to perform every step before the symptom is solved. Start with the first step, and then test for the symptom. If the symptom persists, replace any modules you removed, go to the next step, and test again. Continue down the list until the symptom is solved.

Important: This computer starts up only in Mac OS X. Mac OS 9 is not available as a startup disk and previous versions of the Mac OS should not be installed on this computer.

AirPort Extreme Card

AirPort Extreme Card not recognized

1. Use Software Update in Mac OS X system preferences or see the Apple Software Updates web page to make sure the latest version of AirPort software is installed.
2. Reseat AirPort Extreme Card and make sure AirPort antenna cable is fully connected.
3. Verify settings in Network Preferences pane.
4. Check that AirPort Extreme Card appears in Apple System Profiler under Network overview in System Profile.
5. Replace with known-good AirPort Card.
6. Replace logic board.

Battery

Battery won't charge

1. Make sure that power adapter connector is fully inserted.
2. Remove any connected peripherals.
3. Try known-good power outlet. Green or amber light should glow at power adapter connector.

-
4. Try known-good power adapter and power cord.

Note: Verify that power adapter connector glows amber or green. If the power adapter light is green, turn over the computer and press the battery button. One to five lights glow to show the battery's level of charge. One blinking light indicates that the battery does not have sufficient charge to turn on.

5. Remove battery and reseal it.
6. Reset the power manager by pressing the key combination Control-Option-Shift-power.

Warning: Make sure you do not hold down the "fn" key when resetting the power manager.

7. Update to Mac OS 10.2.4, or boot from external device with 10.2.4.
8. Replace DC-to-DC board.
9. Replace logic board.

Battery won't charge completely

1. If battery reaches 96 percent and doesn't charge further, this is normal operation. Refer to Knowledge Base article 88344 "PowerBook G4, iBook: Battery Does Not Show Full Charge in Mac OS X".
2. If battery charges to 95 percent or less and stops charging before reaching 100 percent, replace DC-to-DC board.

Error Beeps

The computer automatically performs a power-on self test when it is turned on after being fully shut down (not a restart). This section describes what to do if beeps are heard during the startup.

Note: The computer has a memory expansion slot that accepts a 1.25-inch (or shorter) PC-2100 compliant, SO-DIMM memory card. Refer to the Memory Replacement instructions for removal and installation.

Computer beeps once at startup

1. One beep means that no RAM is detected.
2. If a RAM card is installed in the expansion slot, remove it and put in known-good and compatible RAM and restart.
 - If symptom does NOT repeat, replace RAM card.
 - If symptom repeats, replace logic board.
3. If no RAM card is installed, replace logic board.

Computer beeps three times at startup

1. Three beeps means that no RAM banks passed memory testing.
2. If a RAM card is installed in the expansion slot, remove it and put in known-good and compatible RAM and restart.
 - If symptom does NOT repeat, replace RAM card.
 - If symptom repeats, replace logic board.
3. If no RAM card is installed, replace logic board.

Computer beeps four times at startup

1. Four beeps indicates a bad checksum for the remainder of the boot ROM. The ROM (which is located on the logic board) is bad.
2. If a RAM card is installed in the expansion slot, remove it and put in known-good and compatible RAM and restart.
 - If symptom does NOT repeat, replace RAM card.
 - If symptom repeats, replace logic board.
3. If no RAM card is installed, replace logic board.

Related article:

58442: Power On Self-Test Beep Definition - Part 2

Hard Drive

Hard drive will not initialize

1. Boot from Software and Restore DVD. Under the File menu, select Disk Utility, and see if the hard drive appears on the list.
2. If no hard drive is found in Disk Utility, verify the hard drive cable connections.
3. Replace hard drive cable.
4. Replace hard drive.

Important: If the computer is under warranty and data recovery is required, refer to Article 31077: Hard Drive Data Recovery & Warranty Implications, for important information.

The internal hard drive does not spin

1. Disconnect any connected peripherals.
2. Try known-good power outlet.
3. Try known-good power adapter and power cord.
4. Boot from Software and Restore DVD.
5. Verify Disk Utility does not recognize the hard drive.
6. Verify cable connections.
7. Reset the power manager by pressing the key combination Control-Option-Shift-power.

Warning: Make sure you do not hold down the "fn" key when resetting the power manager.

8. Replace hard drive cable.
9. Replace hard drive.

Keyboard

No response from any key on keyboard

1. Remove any connected peripherals.
2. Boot from Software and Restore DVD to verify that it is not a software problem.
3. Turn off the computer. Disconnect the keyboard connector and inspect connectors.
4. Replace keyboard.
5. Replace logic board.

Modem

No modem dial tone

1. Check that the correct modem is selected in the Network Preferences pane. In Modem tab, check that sound is not turned off.
2. It is possible that the modem is connecting but not generating a sound. Check Internet Connect to verify status.
3. Verify known-good analog (not digital) telephone line.
4. Verify known-good RJ11 telephone cable.
5. Verify RJ11 cable is not plugged into Ethernet port.
6. Inspect RJ11 connector and modem port for pin damage.

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7. Verify RJ11 telephone cable is firmly installed in the modem port.
 8. If verifying the system functionality, in the Modem tab, deselect "Wait for Dial Tone Before Dialing."
 9. Verify modem 2-pin connector is plugged into modem correctly.
 10. Replace the RJ11 modem cable and port.
 11. Replace modem.

Optical Drive

The optical drive does not accept CD or DVD disc (mechanical failure)

1. Verify disc is not warped.
2. Verify disc is not the wrong size. The computer will accept only 120 mm round disc. Refer to article 58641 - Macintosh: Using Nonstandard Discs in CD-ROM or DVD-ROM Drives.
3. Replace optical drive.

The disc icon does not show up on the desktop, or a dialog box appears to initialize disc

1. Verify the correct type of disc is being used.
2. Try cleaning the disc. It may not mount if dirty or scratched.
3. Try a different disc.
4. Create new Mac OS X user and log in as that user. (So that the customer does not question the new user, remove the user once disc is verified.)
5. Reseat optical drive cable.
6. Replace optical drive cable.
7. Replace optical drive.

The optical drive does not eject CD or DVD disc

1. Verify disc is not in use.
2. Press and hold Media Eject key at top right corner of keyboard. If that does not work, hold down Function (fn) key and Media Eject key.
3. Drag disc icon to trash or select it and press Command-E.
4. Choose Restart from Apple menu while holding down trackpad button.
5. Replace optical drive.

Ports

The FireWire or USB port is not recognizing devices; or device not recognized by computer

Note: If you are trying to use a serial device with a USB/Serial adapter, check with the manufacturer of the adapter for compatibility.

1. Completely shut down, then press the power button to start the computer.
2. Use Software Update in Mac OS X system preferences to verify that the latest software is installed.
3. Use Apple System Profiler to verify that the computer is recognizing the device.
4. For USB, test ports with a known-good Apple keyboard or mouse. Try different USB device on same port.
5. For FireWire, test by connecting another computer in FireWire Target Disk Mode. Refer to article 58583: How to Use FireWire Target Disk Mode.
6. If a camera, turn on the camera before opening the video application.
7. Verify current driver for the device is installed. Verify that drivers are installed properly for third party, if needed.
8. Create new Mac OS X user and log in as that user. (So that the customer does not question the new user, remove the user once disc is verified.)
9. Try other port if available.
10. Try a different cable. (Cable noise could be a problem.)
11. Eliminate chain by plugging in only one peripheral.
12. If self powered make sure that the power supply is connected and device's LED indicates that it is getting power.
13. Reset the power manager by pressing the key combination Control-Option-Shift-power.

Warning: Make sure you do not hold down the "fn" key when resetting the power manager.

14. Replace logic board.

Sound

Distorted sound from speakers

1. Verify sound is correct with external speakers/headphones. If sound is correct, replace top case.
2. Check balance in Sound preference pane.
3. Replace rear panel assembly with attached speakers.
4. Replace subwoofer.

No sound from speaker(s)

1. Use the Software Update preference pane to verify that the latest software updates have been installed.
2. Press the F3 key to verify that mute mode is not enabled.
3. Press the F4 or F5 key to check the volume setting.
4. Verify no external speakers or headphones are plugged in.
5. In the Sound preference pane confirm that only one device is listed in the Output tab.
6. Shut down computer and restart.
7. Reset PRAM (Press the power button, then hold down the Option-Command-P-R keys until you hear the startup chime at least one additional time after the initial startup chime).
8. Verify that the speaker cable is connected properly to logic board.
9. Replace top case.
10. Replace logic board.

Startup

The computer will not power on

1. Make sure that power adapter connector is fully inserted.
2. Remove any connected peripherals.
3. Try known-good power outlet.
4. Try known-good power adapter and power cord.
5. Remove battery.
6. Press Caps Lock key to see if light on key comes on. If it does, hold power button down for six seconds to shut down the computer and restart.
7. Reset the power manager by pressing the key combination Control-Option-Shift-power.

Warning: Make sure you do not hold down the "fn" key when resetting the power manager.

8. Remove any additional RAM
9. Remove AirPort Card.
10. Try known-good DC board.
11. Verify power button is connected properly to logic board, if power button is not functioning correctly or damaged, replace the top case.
12. Replace logic board.

Display

No display, or dim display, but computer appears to operate correctly

1. Press F2 to increase the screen brightness setting.
2. Remove any connected peripherals.
3. Try known-good power outlet, power adapter and power cord.
4. Reboot the computer—hold down the Control and Command keys and press the Power button, or press and hold the Power button for 5 to 10 seconds to shut down the computer, then press the Power button to restart.
5. Verify backlight cable and LVDS cable connections are seated properly and that the cables are not damaged (refer to display assembly replacement instructions).
6. Replace display assembly.
7. Replace logic board.

When displaying a single color over the screen area, the LCD panel shows one or more pixels that are not properly lit

Active-matrix LCD technology uses rows and columns of addressable locations (pixels) that render text and images on screen. Each pixel location has three separate subpixels (red, green, and blue) that allow the image to be rendered in full color. Each subpixel has a corresponding transistor responsible for turning the subpixel on or off.

There are typically millions of these subpixels on an LCD display. For example, the LCD panel used in the Apple Cinema HD display is made up of 2.3 million pixels and 6.9 million red, green, and blue subpixels. Occasionally, a transistor does not work perfectly, which may result in the affected subpixel being turned on (bright) or turned off (dark). With the millions of subpixels on a display, it is quite possible to have a low number of faulty transistors on an LCD. Therefore, a certain number of subpixel anomalies is considered acceptable. Rejecting all but perfect LCD panels would significantly increase the retail price for products using LCD displays. These factors apply to all manufacturers using LCD technology—not just Apple products.

To determine whether or not the display has an acceptable number of pixel anomalies, follow the steps below:

1. Set the display image to one of the following colors: all-white display, all-red display, all-green display, or all-blue display.
2. Using a jeweler's loupe, pocket microscope, or other magnifying device, identify and count each subpixel anomaly:
 - Bright subpixel anomaly = subpixel that is always on
 - Dark subpixel anomaly = subpixel that is always off
3. **Important:** Check the number of subpixel anomalies with the following chart:

| LCD Size (inches) | Acceptable Number of Subpixel Anomalies | | | Replace the Display | | |
|-------------------|---|---------|-------------|---------------------|-----------|-------------|
| | Bright | Dark | Combination | Bright | Dark | Combination |
| 12.1 to 15.2 | up to 3 | up to 5 | up to 7 | 4 or more | 6 or more | 8 or more |

4. If the number of subpixel anomalies exceeds the acceptable number listed in the chart, replace the LCD panel.
5. If the number of subpixel anomalies is acceptable, explain to the customer that the pixel anomalies are within specifications, and no repair is necessary.

Important: Do not release the specifications to customers. Instead, inform them that a certain number of subpixel anomalies is considered acceptable, and these factors apply to all manufacturers using LCD technology—not just Apple products.

Video (S-Video and Composite adapter)

No video on an external device

1. Make sure you are using the S-Video and Composite adapter cable.
2. Verify TV or VCR is set up properly with correct source.
3. Try different TV or VCR. Check owner's manual for TV or VCR.
4. Replace adapter cable.
5. Replace logic board.

The display is rolling (PAL instead of NTSC)

1. Make sure you are not using Apple's A/V Video Cable.
2. Make sure you are using the S-Video and Composite adapter cable.
3. Go to Displays preference pane; change resolution from PAL setting to NTSC setting.
4. Try a different TV or VCR.
5. Try a different adapter cable
6. Replace logic board.

Display shows ghosting (signal reflection)

1. Verify that cables are correctly installed and firmly seated.
2. Replace video adapter.

Video (RGB adapter)

No video on an external device

1. Make sure RGB adapter cable is fully seated.
2. Click "Detect Displays" button to verify that monitor is being recognized in the Displays preference pane, and is known-good and supported by this computer.
3. Try known-good RGB adapter.
4. Replace logic board.
5. Replace RGB adapter cable.
6. Replace logic board.

Display shows ghosting (signal reflection)

1. Verify that cables are correctly installed and firmly seated.
2. Replace video adapter.

Misc. Symptoms

The computer runs with battery, but not with the power adapter plugged into wall outlet

1. Try known-good power outlet.
2. Try known-good power adapter and power cord.

Note: Verify that power adapter connector glows amber or green. If the power adapter light is green, turn over the computer and press the battery button. One to five lights glow to show the battery's level of charge. One blinking light indicates that the battery does not have sufficient charge to turn on.

Reset the power manager by pressing the key combination Control-Option-Shift-power.

Warning: Make sure you do not hold down the "fn" key when resetting the power manager.

3. Replace DC-in board
4. Replace DC-to-DC board.
5. Replace logic board.

The computer runs when plugged into a wall outlet but not on battery power

1. Reseat battery to verify battery is seated correctly with battery lock engaged.
2. Try known-good charged battery.
3. Reset the power manager by pressing the key combination Control-Option-Shift-power.

Warning: Make sure you do not hold down the "fn" key when resetting the power manager.

4. Replace DC-to-DC board.
5. Replace logic board.

The cursor does not move when you are using trackpad

1. Verify that no USB device is connected.
2. Boot from a Mac OS system CD to verify that it is not a software problem.
3. Reset the power manager by pressing the key combination Control-Option-Shift-power.

Warning: Make sure you do not hold down the "fn" key when resetting the power manager.

4. Check trackpad cable and connection to the logic board (see separate Keyboard and Top Case replacement instructions for location under top case).
5. Replace top case.
6. Replace logic board.

The cursor intermittently does not move or moves erratically

Note: User must touch with the surface of only one finger at a time and point directly down on the trackpad surface.

1. Clean trackpad surface (with computer off, using a non-static-inducing material).
2. Completely shut down, then press the power button to start the computer.
3. Reset the power manager by pressing the key combination Control-Option-Shift-power.

Warning: Make sure you do not hold down the "fn" key when resetting the power manager.

4. Try unit on battery power. If problem goes away, replace power adapter.
5. Place a Mac OS system CD in the optical disc drive, press the start button and hold down the "C" key. Check the cursor movement, to see if the problem is software.
6. Check trackpad cable and connection to the logic board (see separate Keyboard and Top Case replacement instructions for location under top case).
7. Replace top case.
8. Replace logic board.

The microphone is not working

1. In the Sound preference pane select the Input tab. Make sure that the internal microphone device is selected in the list.
2. In the Sound preference pane select the Input tab. Make sure that the input volume is midrange or above.
3. In the Sound preference pane select the Output tab. Make sure the built-in audio controller is selected.

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4. Create new Mac OS X user and log in as that user. (So that the customer does not question the new user, remove the user once disc is verified.)
 5. Reset PRAM (Press the power button, then hold down the Option-Command-P-R keys until you hear the startup chime at least one additional time after the initial startup chime).
 6. Verify microphone cable connection to logic board.
 7. Replace top case (which includes the microphone).
 8. Replace logic board.

The latching mechanism that holds the display closed is not working

Note: As the display closes against the top case, a hook in the top of the display housing should be magnetically pulled down into a slot in the top case, and secured. When the latch button is pushed, the hook should release and retract into the display housing, allowing the display to open.

1. Verify hook operation by exercising the latch mechanism.
2. If the hook does not operate properly, replace the display assembly.
3. If the latch or latch button does not operate properly, replace the bottom case assembly.